

THE BENT

OF TAU BETA PI

The Engineering Honor Society

Winter 2017

TAU BETA PI NATIONAL CONVENTION



The Evolution of Numbers Convention Report

CHAPTERS

ALUMNI CHAPTERS (74)

District 1

- *Central Connecticut, Hartford*
- *Greater Boston Area, MA*

District 2

- *Buffalo, NY*
- *Central Jersey, NJ*
- *Long Island Suburban, NY*
- *Newark, NJ*
- *New York City, NY*
- *New York Capital District, NY*
- *Rochester, NY*
- *Southern Tier, Binghamton, NY*

District 3

- *Lehigh Valley, Bethlehem, PA*
- *Philadelphia, PA*
- *Pittsburgh, PA*
- *Wilmington, DE*

District 4

- *Baltimore, MD*
- *Hampton Roads, Newport News, VA*
- *Kanawha Valley, Charleston, WV*
- *Research Triangle, Durham-Chapel Hill-Raleigh, NC*
- *Richmond, VA*
- *Washington, DC*

District 5

- *Atlanta, GA*
- *Central Florida, Orlando*
- *Daytona Beach, FL*
- *Gainesville, FL*
- *Miami, FL*
- *Midlands, Columbia, SC*
- *Palm Beach/Broward, FL*
- *Piedmont, Clemson, SC*
- *Puerto Rico*
- *Tampa Bay, FL*

District 6

- *Bluegrass, Lexington-Frankfort, KY*
- *Central Alabama, Birmingham*
- *Great Smoky Mountains, Knoxville-Oak Ridge, TN*
- *Greater Gulf Coast, Mobile, AL*
- *Louisville, KY*
- *Mid-South, Memphis, TN*
- *Rocket City, Huntsville, AL*

District 7

- *Ann Arbor Area, MI*
- *Central Michigan, Lansing*
- *Cincinnati, OH*
- *Columbus, OH*
- *Dayton, OH*
- *Flint, MI*
- *Ohio's North Coast, Cleveland*
- *Southeastern Michigan, Detroit*
- *West Michigan, Grand Rapids*

District 8

- *Chicago Area, IL*
- *Central Illinois, Urbana-Champaign*
- *Indianapolis, IN*
- *Milwaukee, WI*

District 9

- *Rolla, MO*
- *St. Louis, MO*

District 10

- *Central Texas (Austin/San Antonio)*
- *DFW (Dallas-Fort Worth, TX)*
- *Greater New Orleans, LA*
- *Texas Gulf Coast, Houston*

District 11

- *Ames, IA*
- *Minnesota, Twin Cities, MN*

District 12

- *Pikes Peak, CO*
- *Front Range, CO/WY*
- *Salt Lake City, UT*
- *Treasure Valley, Boise, ID*

District 13

- *El Paso, TX*
- *Phoenix, AZ*
- *Sun City, AZ*
- *Tucson, AZ*

District 14

- *Columbia River Basin, Richland, WA*
- *Portland, OR*
- *Puget Sound, Seattle, WA*

District 15

- *Sacramento, CA*
- *San Francisco Bay Area, CA*
- *San Francisco Peninsula, Palo Alto, CA*

District 16

- *Greater San Diego, CA*
- *Southern California, Los Angeles*

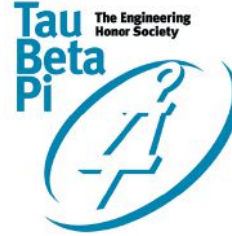
CA K	16	California State Univ., Northridge
CA A	15	Univ. of California, Davis
CA M	15	Calif. Poly. St. Univ., San Luis Obispo
CA N	16	California State Poly. Univ., Pomona
CA E	16	San Diego State Univ.
CA O	16	Loyola Marymount Univ.
CA P	16	Northrop Univ. (inactive)
CA P	15	California State Univ., Fresno
CA S	16	Univ. of California, Santa Barbara
CA T	16	Univ. of California, Irvine
CA Y	15	California State Univ., Sacramento
CA F	16	Univ. of the Pacific
CA X	16	California State Univ., Fullerton
CA U	16	Univ. of California, San Diego
CA Q	16	Harvey Mudd College
CA AA	15	California State Univ., Chico
CA AB	16	Univ. of California, Riverside
CA AF	15	San Francisco State Univ.
CA AD	15	Univ. of California, Santa Cruz
CA AE	16	Univ. of San Diego
CO A	12	Colorado School of Mines
CO B	12	Univ. of Colorado at Boulder
CO G	12	Univ. of Denver (inactive)
CO D	12	Colorado State Univ.
CO E	12	Univ. of Colorado at Denver
CO Z	12	United States Air Force Academy
CT A	1	Yale Univ.
CT B	1	Univ. of Connecticut
CT G	1	Univ. of Hartford
DE A	3	Univ. of Delaware
DC A	4	Howard Univ.
DC B	4	Catholic Univ. of America
DC G	4	George Washington Univ.
FL A	5	Univ. of Florida
FL B	5	Univ. of Miami
FL G	5	Univ. of South Florida
FL D	5	Univ. of Central Florida
FL E	5	Florida Atlantic Univ.
FL Z	5	Florida Inst. of Technology
FL H	5	Florida A&M Univ.-Florida State Univ.
FL O	5	Florida International Univ.
FL I	5	Embry-Riddle Aeronautical Univ.
GA A	5	Georgia Inst. of Technology
GA B	5	Mercer Univ.
ID A	14	Univ. of Idaho
ID B	12	Idaho State Univ.
ID G	12	Boise State Univ.
IL A	8	Univ. of Illinois at Urbana-Champaign
IL B	8	Illinois Inst. of Technology
IL G	8	Northwestern Univ.
IL D	8	Bradley Univ.
IL E	8	Southern Illinois Univ. at Carbondale
IL Z	8	Univ. of Illinois at Chicago
IN A	8	Purdue Univ.
IN B	8	Rose-Hulman Inst. of Technology
IN G	8	Univ. of Notre Dame
IN D	8	Valparaiso Univ.
IN E	8	Trine Univ.
IN Z	8	Indiana Univ.-Purdue Univ. Indianapolis
IA A	11	Iowa State Univ.
IA B	11	Univ. of Iowa
KS A	9	Univ. of Kansas
KS B	9	Wichita State Univ.
KS G	9	Kansas State Univ.
KY A	6	Univ. of Kentucky
KY B	6	Univ. of Louisville
KY G	6	Western Kentucky Univ.
LA A	10	Louisiana State Univ.
LA B	10	Tulane Univ.
LA G	10	Louisiana Tech Univ.
LA D	10	Univ. of Louisiana at Lafayette
LA E	10	Univ. of New Orleans
ME A	1	Univ. of Maine
MD A	4	Johns Hopkins Univ.
MD B	4	Univ. of Maryland
MD G	4	United States Naval Academy
MD D	4	Univ. of Maryland Baltimore County
MD E	4	Morgan State Univ.
MA A	1	Worcester Polytechnic Inst.
MA B	1	Massachusetts Inst. of Technology
MA G	1	Harvard Univ. (inactive)
MA D	1	Tufts Univ.
MA E	1	Northeastern Univ.
MA Z	1	Univ. of Massachusetts at Amherst
MA H	1	Boston Univ.
MA O	1	Univ. of Massachusetts Lowell
MA I	1	Western New England Univ.
MI A	7	Michigan State Univ.
MI B	11	Michigan Tech. Univ.
MI G	7	Univ. of Michigan
MI D	7	Univ. of Detroit Mercy
MI E	7	Wayne State Univ.
MI Z	7	Kettering Univ.
MI H	7	Lawrence Technological Univ.
MI O	7	Oakland Univ.
MI I	7	Univ. of Michigan-Dearborn
MI K	7	Western Michigan Univ.
MI A	7	Grand Valley State Univ.
MN A	11	Univ. of Minnesota-Twin Cities
MN B	11	Univ. of Minnesota, Duluth
MS A	6	Mississippi State Univ.
MS B	6	Univ. of Mississippi
MO A	9	Univ. of Missouri-Columbia
MO B	9	Missouri Univ. of Science & Technology
MO G	9	Washington Univ.
MO D	9	Univ. of Missouri-Kansas City
MO E	9	Saint Louis University
MT A	12	Montana State Univ.
MT B	12	Montana Tech of the Univ. of Montana
NE A	9	Univ. of Nebraska-Lincoln
NV A	15	Univ. of Nevada, Reno
NV B	15	Univ. of Nevada, Las Vegas
NH A	1	Univ. of New Hampshire
NH B	1	Dartmouth College
NJ A	2	Stevens Inst. of Technology
NJ B	2	Rutgers Univ.

NJ G	2	New Jersey Inst. of Technology
NJ A	2	Princeton Univ.
NJ E	2	Rowan Univ.
NJ Z	2	The College of New Jersey
NM A	13	New Mexico State Univ.
NM B	13	Univ. of New Mexico
NM G	13	New Mexico Inst. of Mining & Tech.
NY A	2	Columbia Univ.
NY B	2	Syracuse Univ.
NY T	2	Rensselaer Polytechnic Inst.
NY D	2	Cornell Univ.
NY E	2	New York Univ. (inactive)
NY Z	2	Polytechnic Inst. of Brooklyn (inactive)
NY H	2	City College of CUNY
NY O	2	Clarkson Univ.
NY I	2	Cooper Union School of Engineering
NY K	2	Univ. of Rochester
NY A	2	Pratt Inst. (inactive)
NY M	2	Union College
NY N	2	SUNY at Buffalo
NY E	2	Manhattan College
NY O	2	SUNY at Stony Brook
NY P	2	Rochester Inst. of Technology
NY S	2	Polytechnic Institute of New York Univ.
NY T	2	Alfred Univ.
NY Y	2	Binghamton University
NY Y	2	United States Military Academy
NC A	4	North Carolina State Univ.
NC B	4	Univ. of N.C. at Chapel Hill (inactive)
NC G	4	Duke Univ.
NC D	4	Univ. of North Carolina at Charlotte
NC E	4	North Carolina A&T State Univ.
NC Z	4	East Carolina University
ND A	11	North Dakota State Univ.
ND B	11	Univ. of North Dakota
OH A	7	Case Western Reserve Univ.
OH B	7	Univ. of Cincinnati
OH G	7	Ohio State Univ.
OH D	7	Ohio Univ.
OH E	7	Cleveland State Univ.
OH Z	7	Univ. of Toledo
OH H	7	Air Force Inst. of Technology
OH O	7	Univ. of Dayton
OH I	7	Ohio Northern Univ.
OH K	7	Univ. of Akron
OH A	7	Youngstown State Univ.
OH M	7	Wright State Univ.
OH N	7	Cedarville Univ.
OH E	7	Miami Univ.
OK A	9	Univ. of Oklahoma
OK B	9	Univ. of Tulsa
OK G	9	Oklahoma State Univ.
OR A	14	Oregon State Univ.
OR B	14	Portland State Univ.
OR G	14	Univ. of Portland
PA A	3	Lehigh Univ.
PA B	3	Pennsylvania State Univ.
PA G	3	Carnegie Mellon Univ.
PA D	3	Univ. of Pennsylvania
PA E	3	Lafayette College
PA Z	3	Drexel Univ.
PA H	3	Bucknell Univ.
PA O	3	Villanova Univ.
PA I	3	Widener Univ.
PA K	3	Swarthmore College
PA A	3	Univ. of Pittsburgh
PA M	3	Penn State Erie, The Behrend College
PR A	5	Univ. of Puerto Rico
RI A	1	Brown Univ.
RI B	1	Univ. of Rhode Island
SC A	5	Clemson Univ.
SC B	5	Univ. of South Carolina
SC G	5	The Citadel
SD A	12	South Dakota School of Mines & Tech.
SD B	11	South Dakota State Univ.
TN A	6	Univ. of Tennessee
TN B	6	Vanderbilt Univ.
TN G	6	Tennessee Tech. Univ.
TN D	6	Christian Brothers Univ.
TN E	6	Univ. of Memphis
TN Z	6	Univ. of Tennessee at Chattanooga
TX A	10	Univ. of Texas at Austin
TX B	13	Texas Tech Univ.
TX G	10	Rice Univ.
TX A	10	Texas A & M Univ.
TX E	10	Univ. of Houston
TX Z	10	Lamar Univ.
TX H	10	Univ. of Texas at Arlington
TX O	13	Univ. of Texas at El Paso
TX I	10	Southern Methodist Univ.
TX K	10	Prairie View A & M Univ.
TX A	10	Texas A & M Univ.-Kingsville
TX M	10	Univ. of Texas at San Antonio
TX N	10	Univ. of Texas-Rio Grande Valley
UT A	12	Univ. of Utah
UT B	12	Brigham Young Univ.
UT G	12	Utah State Univ.
VT A	1	Univ. of Vermont
VT B	1	Norwich Univ.
VA A	4	Univ. of Virginia
VA B	4	Virginia Polytechnic Inst. & State Univ.
VA G	4	Old Dominion Univ.
VA D	4	Virginia Military Inst.
VA E	4	Virginia Commonwealth Univ.
WA A	14	Univ. of Washington
WA B	14	Washington State Univ.
WA G	14	Seattle Univ.
WA D	14	Gonzaga Univ.
WA V	4	West Virginia Univ.
WV B	4	West Virginia Univ. Inst. of Technology
WI A	8	Univ. of Wisconsin-Madison
WI B	8	Marquette Univ.
WI G	8	Univ. of Wisconsin-Milwaukee
WI A	8	Milwaukee School of Engineering
WI E	8	Univ. of Wisconsin-Platteville
WY A	12	Univ. of Wyoming

COLLEGIATE CHAPTERS (252)

Chap. Dist.	Institution
AL A	6 Auburn Univ.
AL B	6 Univ. of Alabama
AL G	6 Univ. of Ala. at Birmingham
AL A	6 Univ. of Ala. in Huntsville
AL E	6 Univ. of South Alabama
AK A	14 Univ. of Alaska Fairbanks
AZ A	13 Univ. of Arizona
AZ B	13 Arizona State Univ.
AZ G	13 Northern Arizona Univ.
AZ D	13 Embry-Riddle Aero. Univ., Prescott
AR A	9 Univ. of Arkansas
CA A	15 Univ. of California, Berkeley
CA B	16 California Inst. of Technology
CA G	15 Stanford Univ.
CA D	16 Univ. of Southern California
CA E	16 Univ. of California, Los Angeles
CA Z	15 Santa Clara Univ.
CA H	15 San Jose State Univ.
CA O	16 California State Univ., Long Beach
CA I	16 California State Univ., Los Angeles

the Bent^{of}



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*f*ounded at Lehigh University, South Bethlehem, Pennsylvania, June 15, 1885, by Edward H. Williams Jr., A.B., A.C., E.M., Sc.D., LL.D. (1849-1933). Key and name registered in U.S. Patent and Trademark Office. Member, American Society for Engineering Education and (co-founder) Association of College Honor Societies. Affiliate, American Association for the Advancement of Science.

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ON THE COVER:
The 111th Convention of Tau Beta Pi was held in San Diego, CA, on October 6-8.



Cover artist: Dali Polivka

Tau Beta Pi:
THE BENT



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The Tau Beta Pi Association was founded at Lehigh University in 1885 by Edward Higginson Williams Jr. to mark in a fitting manner those who have conferred honor upon their Alma Mater by distinguished scholarship and exemplary character as students in engineering, or by their attainments as alumni in the field of engineering, and to foster a spirit of liberal culture in engineering colleges.
—Preamble to the Constitution

Membership? It's More Than an Honor!

aS I WRITE MY FINAL Council's Corner as President of our Association, I'd like to take this opportunity to reflect on my experiences and the many opportunities and benefits I've received from Tau Beta Pi. When we were producing a promotional video at Convention years ago to tell eligible students about TBI, we asked members to complete the sentence: "Tau Beta Pi is...." I'm sure there are some common themes that come to mind when we ponder how we would complete that sentence. I'll share a few that I have heard and consider myself, but, also invite you to consider what it is for you.

Many of you, I am sure, think first that "Tau Beta Pi is an honor." Our purpose, as expressed in our Constitution, is to "mark in a fitting manner..." We most certainly are an honor society and we recognize the achievements of engineering students and alumni. But we need to be—and are—more than just this. We have been successful as we do not simply give members a certificate and key. Our Engineering Futures program provides professional development to engineers on college campuses, our MindSET program inspires K-12 students to become future engineers, and the many community service activities of our collegiate and alumni chapters show our dedication to the profession and the community.

What I think of next is that "Tau Beta Pi is a society that recognizes and promotes integrity and high ethical standards." Our public creed of "Integrity and Excellence" makes this clear as does the great emphasis we place on character when we consider scholastically eligible candidates. As engineers, we are dedicated to serving the common good and bettering society. Watching the news on any given day, you see stories of ethical lapses—as Tau Bates, we must maintain the highest of standards in all that we do. Our website has a Code of Engineering Ethics, which states in part: "Engineers uphold and advance the integrity, honor, and dignity of the engineering profession." Our emphasis on integrity distinguishes us from most other honor societies. Promoting ethical behavior and decisions in all aspects of our daily lives will most certainly, to paraphrase our mission, make the world a better place.

While not always at the forefront, I offer one last thought: "Tau Beta Pi is a family/community." I was hesitant to attend my first Convention as a chapter president. I wondered how a gathering of nearly 400 of the best and brightest engineers could be an enjoyable way to spend the weekend in Rapid City, SD, no less! When I boarded the small propeller plane from Denver, it could

have been a chartered flight. It was almost all fellow Tau Bates heading to Convention, and I was struck by the immediate sense of community. From exploring the badlands of South Dakota with new friends to being stuck in the hotel during the blizzard when the power went out, I cherish the memories of that first Convention. It was the sense of belonging to a group of like-minded engineers who excel academically, but who are also looking to make

a difference in the world, that really solidified my desire to stay active in TBI.



I just attended my 17th Convention in San Diego. Each one is memorable for its own reasons: from the haunted Biltmore hotel in Providence over Halloween, the trains running through our hotel in Indianapolis, the delegate from the Maryland Gamma Chapter at the Naval Academy objecting (in jest) to granting a chapter at

West Point while we were in Denver, to the many social activities and "Tau Beta Bonding" that took place after completing business during all of our Conventions. Each one rekindles old friendships and creates new lifelong connections. While many of you have not been able to attend Convention, I hope you have been able to gain those lifelong connections within your chapter, at a district conference, or through engagement in our alumni chapters.

It's more than just attending Convention. I have facilitated countless Engineering Futures sessions, served as a District 4 Director in supporting chapter leaders, visited with collegiate and alumni chapters and attended alumni gatherings. All of these, and more, have been an opportunity to witness firsthand the strength of our membership. By my best estimate, I have visited over 125 collegiate and alumni chapters so far, including two that I had the honor of installing. All of our chapters are doing great things for the profession and in their communities. I hope one day to be able to say I've visited all of our chapters!

I could not have imagined when first initiated that I would one day be President of the Association and be able to meet so many dedicated volunteers, outstanding alumni, chapter leaders, and other members. I have always been inspired by the accomplishments of our Laureates and Distinguished Alumni and their dedication to

our profession and community. Meeting with alumni who support TBP and hearing about their careers, and what inspires them to give back and support student members, has to be one of the highlights of being President.

Everyone has something to contribute—whether it is participating in one of our alumni chapters, advising a student one, or serving as an official. For those of you who are not engaged with TBP, I invite you to reconnect and consider giving back in some way, with your time, your treasure, or your talents.

At my alma mater, George Washington University, departing editors of the student newspaper write “-30-” columns, named for the notation that is traditionally used by journalists to indicate the end of a story, in the final issue of the academic year. However, this is not the end of my involvement, just a transition to a different role. I am glad to continue serving on the Executive Council and look forward to seeing our Association grow even more in both size and importance.

Thank you for the opportunity to lead our vibrant Association and the support and friendship from so many Tau Bates. Our members are what makes the Association special and I look forward to making and renewing life-long connections and see the extraordinary contributions that members will make to create a better world. The council I lead named itself the “Elevate” council. That is really what we should all strive to do—elevate Tau Beta Pi and strengthen our Association for the future. We will find increased value from our membership and ensure that future members reap the same benefits that we have—and hopefully even more.

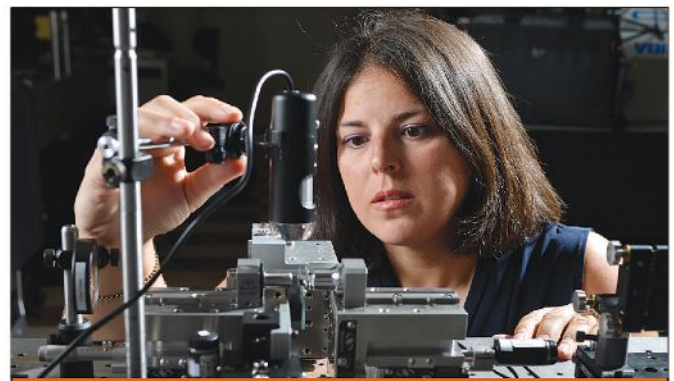
I hope you will consider joining me and give back in some way to “Elevate” Tau Beta Pi!

Joseph P. (J.P.) Blackford,
District of Columbia Gamma '95, President

2017 District Conferences

THE DISTRICT PROGRAM provides a vital link between the Association and individual chapters. Each year the Directors meet with students at regional conferences to provide both retiring and new officers opportunities to improve chapter operations and to socialize. **Interested alumni are encouraged to attend** but should email tbp@tbp.org for details. All chapters are urged to elect new officers before their District Conference.

DISTRICT	LOCATION	DATE
1	Durham, NH	Apr. 8-9
2	New York, NY	Feb. 18-19
3	Bethlehem, PA	Feb. 24-25
4	Morgantown, WV	Apr. 8
5	Atlanta, GA	Apr. 1-2
6	Huntsville, AL	Mar. 31-Apr. 1
7	Ann Arbor, MI	Apr. 8
8	Madison, WI	Apr. 1
9	Tulsa, OK	Mar. 3-4
10	Baton Rouge, LA	Mar. 3-4
11	Duluth, MN	Apr. 8
12	Golden, CO	Feb. 24-25
13	El Paso, TX	Mar. 24-25
14	Moscow, ID	Feb. 25-26
15	San Jose, CA	Mar. 11
16	Irvine, CA	Apr. 8



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EDITORIAL

The Covers You'll Never See

Well, that isn't entirely true. About two-thirds of current subscribers to *The Bent* will never see the covers pictured below. These covers represent a new cost-savings initiative and communication tool for our four-year subscribers.

As you may recall, part of a new member's initiation fee is a four-year subscription to *The Bent*. In the past, we mailed multiple expiration notices to members. While we still plan to mail one notice, these covers will alert members when they receive their next-to-last issue and last issue. We hope these will catch the eye of our readers and remind them to renew. Electronic subscribers will receive a notice by email.

Electronic Subscription Update

Two years ago, we officially launched the online version of *The Bent*. While a PDF version had been available to life subscribers since 2010, the Winter 2015 issue marked the inaugural interactive flip-book format alongside the PDF version. At that time, just a little over two-tenths of 1 percent of subscribers received *The Bent* electronically. After a year, the number jumped to 1.3 percent or 1,100 of our 85,000 subscribers. As of this issue, the number now stands at 7 percent or nearly 6,000 subscribers!

One of the major drivers in the shift to electronic subscription was a change implemented last fall to the new member catalog cards. While the old paper 3x5 catalog cards (newer members, ask someone initiated prior to 2012) were limited in the amount of information we could collect, the online ones are not. Now, new members have the option of a Bent key charm or key pin and they can opt for a print version, an electronic version, or both. Nearly 3,500 new members opted for an electronic version and 1,300 opted for both versions last year. Interestingly, 6,300 new members, or 57 percent, chose to receive *The Bent* only in print. While somewhat unexpected, it does seem to indicate the era of the printed magazine may not be dead. In fact, six in ten of our millennial initiates are opting for a printed copy this year. Just under 2 percent, or 1,025, of life subscribers are receiving *The Bent* electronically.

Price Increase

After careful review, the Executive Council, on my recommendation, increased the price of a life subscription to \$95 effective January 1, 2017. Notable among the reasons for this change is that interest in advertising in *The Bent* continues to decrease. To compensate, we need to ensure the cost of producing the magazine does not negatively impact our other operations. A \$95 life subscription will provide approximately \$4.75 per year per subscriber while costs last year were \$4.04 per subscriber. This will provide a little extra revenue in the short term and will help address increased costs in the future.

One of the purposes of a life subscription is to provide funding for the Fellowship Program; over 1,600 students have received \$6.4 million in stipends! Upon the cancellation or death of a subscriber, a life subscription is transferred to the Fellowship Fund. While this is a wonderful benefit, I see many \$25 (before 1963) and \$35 (before 1989) subscriptions transferred each year. This

adds very little to the Fellowship Fund. I expect that a \$75 subscription transferred in 50 years will, adjusted for inflation, be even less!

While \$95 represents a 27 percent increase, it is still a great deal. A 25-year-old member can expect to receive *The Bent* for 55 years. At the annual price of \$10, this represents a \$550 value for only \$95.

Looking back historically, the \$25 subscriptions first offered in 1929 would cost \$350 in 2016 dollars while a \$35 subscription first offered in 1963 would cost \$275.

For a limited time, members who purchase a \$95 life subscription will receive a Tau Beta Pi membership card and license plate frame (a \$32 value) at no additional cost. For members who already have a life subscription, consider upgrading your subscription. If you pay the difference between your original subscription price and \$95, you will help *The Bent* financially and will also receive a card and frame. Don't miss out on this great deal! Visit www.tbp.org/?LifeSub for more information.

Until later,



**Get Ready for
Tau Beta Pi Day - 3.14.17**

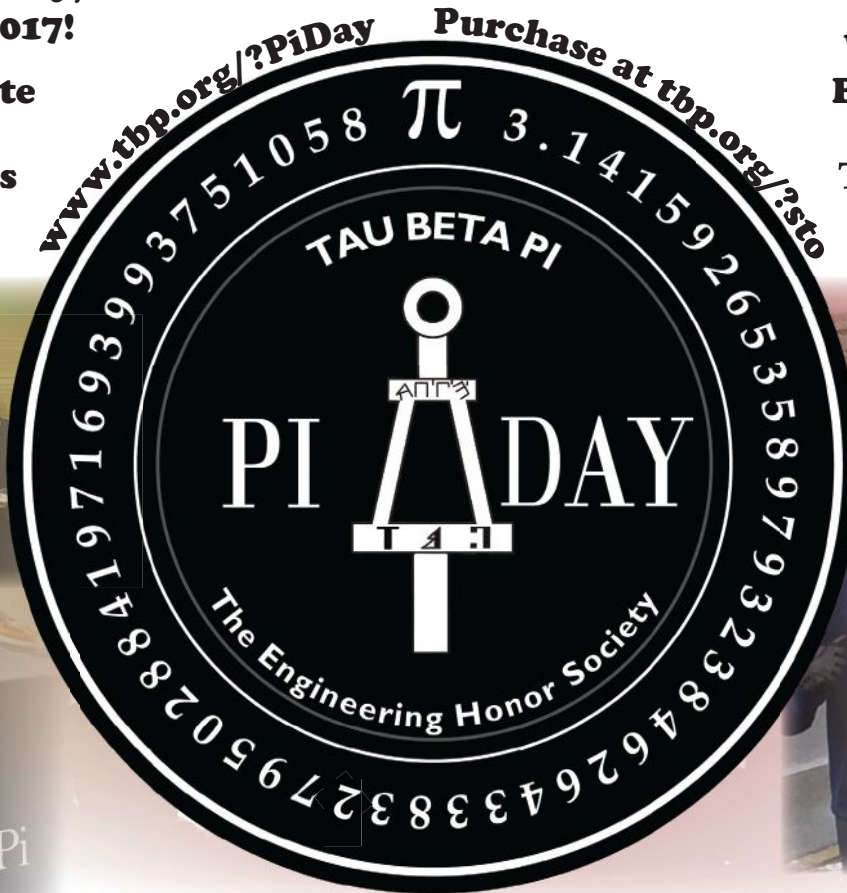


**Show your
TBPI spirit on
Pi Day: Tuesday,
March 14, 2017!**

**Increase
awareness of
Tau Beta Pi!**

**Participate
in local
activities
& visit:**

**Wear your
Bent charm
or pin, a
TBPI t-shirt
or hoodie.**





WHO'S WHO

Michael R. Bloomberg, *Maryland Alpha '64*, is giving \$300 million to



the Johns Hopkins University school of public health to focus on five challenges the school's experts say are contributing to a decline in Americans' life expectancy. These are drug addiction, obesity, gun violence, adolescent health, and environmental threats. The gift will fund new faculty positions and fellowships, research and scholarships as part of the Bloomberg American Health Initiative. It brings the businessman and former New York City mayor's total donations to Johns Hopkins institutions to \$1.5 billion.

Jane and **Andrew M. Bursky**, *Missouri Gamma '78*, have gifted



\$10 million to Washington University's school of medicine in St. Louis to support research that harnesses the immune system to fight cancer, infectious diseases, and disorders caused by autoimmunity and immune deficiencies. The gift from the two alumni will advance cutting-edge work at a center for human immunology and immunotherapy programs, which will be named for them. Bursky is a co-founder and chief executive officer of private-equity firm Atlas Holdings.

Stuart L. Cooper, Ph.D., *Massachusetts Beta '63*, has become president-elect of Sigma Xi and will serve as president from July 1, 2017, to June 30, 2018. He is a professor of chemical engineering at Ohio State University. A member of the

National Academy of Engineering, Cooper was on the faculty of the University of Wisconsin for 26 years and then served as engineering dean at the University of Delaware, chief academic officer at Illinois Institute of Technology, and provost at North Carolina State University. At both Wisconsin and Ohio State, he was chairman of the C.E. departments.



Adi B. Godrej, *Massachusetts Beta '63*, has received a 2016 Clinton



Foundation award for "Leadership in Private Sector." He is chairman of the Godrej Group, a more than 100-year-old family conglomerate, with operations in India and several other countries. Godrej is chairman of the board of the Indian School of Business and former president of the Confederation of Indian Industry. He has been a member of the dean's advisory council of the MIT Sloan School of Management.

Margaret G. Guo, *Massachusetts Beta '16*, was chosen as the 2016 NCAA Woman of the Year.



The award recognizes graduating female student-athletes who have distinguished themselves in athletics, academics, leadership, and community service. A swimmer, Guo graduated from MIT with dual degrees in electrical engineering and computer science, and biological

engineering. She is currently working on her doctor of medicine and Ph.D. at Stanford University and already has two patents related to the biotechnology field.

Pamela M. Norris, Ph.D., *Virginia Gamma '87*, has received the Society of Women



Engineers' distinguished engineering educator award, presented to an individual who has made significant contributions to the profession through education. She is professor of mechanical and aerospace engineering and executive associate dean for research at the University of Virginia school of engineering and applied science. Norris has founded two research laboratories, secured three patents (two more are pending), and secured more than \$25 million worth of research grants to UVA.

Jason C. Stith, Ph.D., P.E., *Kentucky Alpha '04*, has been named the



National Society of Professional Engineers 2016 young engineer of the year. He is a civil engineer at Michael Baker International in Louisville, KY, and consults at other offices nationwide. Stith is also the recent recipient of two other honors: featured among the top 20 engineers under 40 by *ENR Midwest*, an engineering publication, and named Kentucky young engineer of the year by the Kentucky Society of Professional Engineers.

New Executive Councillors

The delegates to the 2016 Convention in San Diego, CA, elected three new members to the Executive Council. They will serve the 2017-19 term and join the five members elected in 2013 who are serving terms that end in 2017 or 2018. The Executive Council comprises eight Tau Beta Pi alumni who serve staggered terms of three years.

The other members of the Executive Council are Joseph P. Blackford, District of Columbia Gamma '95; Susan L.R. Holl, Ph.D., California Lambda '76; George J. Morales, Ph.D., Florida Epsilon '06, Alan J. Passman, Florida Alpha '06; and Norman Pih, Tennessee Alpha '82.

Following the closing of Convention, the Executive Council met and elected officers for the upcoming year. Officers are elected from among the members of the Council and serve for a period of one year. After serving as vice president for one year, the vice president automatically becomes the president the following year. The officers for 2017 include: President Norman Pih, Vice President Susan Holl, Secretary George Morales, and Treasurer Alan Passman. Executive Director Gomulinski serves as a non-voting member of the Executive Council.

Mennatoallah M. Youssef, Ph.D., Virginia Gamma '04, was nominated by the Richmond Alumni Chapter. She is a graduate of Old Dominion University, where she earned a bachelor of science *magna cum laude* and an M.S., both in electrical engineering. She then attended the University of Dayton, completing her Ph.D. in 2011 focusing her research on pattern recognition and computer vision applications for human activity recognition. Menna was a Graduate Student Research Program fellow and Virginia Space Grant Consortium fellow at NASA Langley researching electromagnetic propagation in aircraft fuselages and interned for NATO working on passive radar scenario testing. As an instructor at Old Dominion, she developed a strong interest in STEM and education reform that led her to work on developing initiatives in rural communities in the Middle East and North Africa region. In 2014, Menna joined the United States Patent and Trademark Office as a Patent Examiner in the Image Analysis workgroup. She served as a TBPI chapter president and as an advisor for VA Gamma. She is currently a member of the Advisor Recruitment and Development Committee.

Wayne B. Paugh, Esq., Florida Gamma '93, was nominated by the Front Range Alumni Chapter. He received a B.S. in mechanical engineering and a B.A. in communications in 1993. He was an applications engineer until earning a graduate degree in the management of technology. Wayne then pursued a career change at law school in the DC area and specialized in intellectual property. He spent 13 years in Washington and worked primarily in federal government. During this time, Wayne was United States coordinator for international intellectual property enforcement, responsible for coordinating resources of the U.S. Government to protect American IP and to promote international trade and U.S. global competitiveness. Ultimately, he relocated to the Denver area as a special assistant United States attorney in the major crimes division of the U.S. attorney's office for the district of Colorado. He is also an assistant chief counsel in the U.S. Department of Homeland Security in Denver. Wayne has served as an Engineering Futures Facilitator for three years.



Menna Youssef, left, George Youssef, center, and Wayne Paugh after their election at the San Diego Convention.

George Youssef, New Jersey Gamma '01, was nominated by the Central Jersey Alumni Chapter. He is a graduate of the New Jersey Institute of Technology (NJIT) where he earned a B.S. in electrical engineering *cum laude* from NJIT's Albert Dorman Honors College. George joined the General Electric company field engineer program in 2002 working on gas turbines around the globe. He has been a field engineer, resource engineer, training manager, and senior customer service leader in areas ranging from New Jersey and Georgia to the United Arab Emirates. In a recent position, he was responsible for outage planning and execution, upgrades, and parts and repairs for ten nuclear power plants in PA, NJ, and CT. George currently holds a service director position supporting the boiler services business in the western United States. While at NJIT, he was active in Tau Beta Pi and served as a chapter president. George was a District 2 Director from 2009-16 covering the six chapters in New Jersey. He is married with one daughter and recently relocated from New Jersey to California.



LETTERS

Wireless Wake-Up Call

• I read the Summer 2016 article “Wireless Wake-Up Call: A New Paradigm in EMF Science.” This article is a ‘wake-up’ call to those who definitely think there are not inherent side-effects to cellular radiation and the like. Think about it for a second: the cell phone you carry is essentially a mini-microwave transmitter.

While this is a highly controversial topic that does indeed require more independent study, I commend Jeromy for taking the time and dedicating his career to seek out the answers. Sure, some may disagree and think all is well, but this article does require reflection from not just my fellow Tau Bates, but the public in general.

I also appreciate that the article was written so anyone, even without a technical background, could understand it. In fact, it was the best article in *The Bent* that I have read so far.

Cheers Jeromy—and keep on with this topic!

*Jesse P. Samluk, Ph.D.,
DE A '14*

• I am a current subscriber to *The Bent*, and I am incredibly disappointed to see this magazine publishing nonsense like the EMF article. It was filled with conspiracy-theory laden claims and research that was blown out of proportion.

I would not expect an honorary to publish something like this in its magazine, coming from a society of high-performing engineers.

Multiple independent organizations have studied EMF and non-ionizing radiation for 30 years and have come to find “no conclusive and consistent evidence” that EMF causes any harm in humans.

<http://www.nap.edu/read/5155/chapter/2#2>

http://www.who.int/peh-emf/publications/elf_ehc/en/

I have been using my four-year subscription that comes with be-

coming a new member. I will not be renewing my subscription when my current one runs out.

Jeremiah C. Traeger, AZ A '14

• I was unpleasantly surprised by the poor editorial judgment displayed in running the article “Wireless Wake-Up Call.”

Tau Beta Pi emphasizes the importance of personal integrity, and the report of a true Tau Bate must be unbiased and factual, regardless of potential underlying financial motives. The author, Mr. Johnson, fails to disclose that he sells EMF mitigation services.

In fact, the entire article is an “infomercial” almost devoid of numerical data, which employs “FUD” (fear, uncertainty & doubt) techniques to persuade the reader to visit the author’s web site, where consulting services are offered for sale. Even the footnotes are absurdly withheld from the printed article and instead placed on this web site.

The subject of biological effects from electro-magnetic fields is a real one that is worthy of serious academic study and discussion. The readers of *The Bent*, who are among the best-educated engineers, deserve serious scholarship, not medicine show theatrics.

Jeff Hakner, NY I '91

• This is a letter regarding the EMF Science article in the Summer 2016 issue. I am far from qualified to comment on science behind the claims made by Jeromy Johnson. And new theories that go against conventional wisdom have on occasion proven to be correct.

But, to paraphrase the *Skeptical Inquirer* (<http://www.csicop.org/si>), extraordinary claims require extraordinary proof. Instead the article follows the format of fringe science, complete with anecdotal evidence: symptoms a week after wireless meters were installed; correlation to prove causation; and has

a healthy dose of conspiracy theory: industry friendly scientists; FCC heavily influenced by the wireless industry; ...

Meanwhile, this year I upgraded to 802.11ac wifi and have had the best yield, ever, from the tomato plants I plant in pots on my deck. Of course, commercial farmers and the USDA—that is heavily aligned with the farming industry—would not want that word to get out.

Robert E. Silver, NY P '80

• The EMF article was quite an eye-opener. Something written by a fellow engineer carries some weight! I had often wondered about the wireless gateway in our home and our cell phones. I’m now taking steps to reduce the levels and wondered if you could give me some feedback.

1. First, on cell phones... I carry my iPhone in my pocket. Amazon offers some cases which claim to have a shield on the front cover to block EMF radiation. The theory is that it will reflect the radio waves away from your body, but not absorb them (which would cause the phone to compensate by emitting at higher power levels). The phone is then safer to put in your pocket or make a call against your ear, as long as the shielded side is towards the body. Do you know if these are effective?

2. On our Comcast wireless gateway... I’ve shut off the 5 GHz radio, leaving only the 2.4 GHz operational. I’m hoping this reduces the radiation by 50%. Is there any data on that?

I’m also implementing some of your other recommendations, such as hard-wiring some ethernet cables into various rooms in the home, and getting a separate modem and wireless router with an off button for the wifi.

Thanks for your good work getting the word out about this risk!

Scott A. Lissit, PA H '82

[Jeromy Johnson writes: *Thank you for the excellent feedback to the EMF article in the summer issue. I*

received dozens of emails that were evenly split in agreement/disagreement with its premise. I am grateful that so many TBPI members not only follow this subject with great interest, but that some members have been working toward solutions for decades. For those who were in complete disagreement with the article, I point to how the science has evolved further since the article was written. In May, the U.S. National Toxicology Program (NTP) reported preliminary results of one of the best funded scientific studies ever performed on the carcinogenic effects of cell phone radiation. It was found that GSM/CDMA (2G) radiation causes cancer in male rats at exposure levels below what the FCC says is safe (below the thermal threshold). The American Cancer Society stated that the results marked “a paradigm shift in our understanding of radiation and cancer risk.” In contrast, the FCC recently announced that the United States is moving full steam ahead with the rollout of 5G wireless technology, which will greatly increase our exposures to RF. The next five years should be very interesting as our reliance upon and addiction to this technology increases along with our understanding of how harmful these exposures are to the health of our families.]

What’s In a Name?

• To become an “engineer” in the U.S., there is currently no licensure requirement. In my humble opinion, this is an issue.

In many developed countries, a job title of “engineer” has a professional designation similar to a doctor having the licensed designation as M.D. or D.O. ...or, a lawyer who passed the bar exam and having the designation J.D. In complete contrast in the U.S., in some industries here, if a person has no engineering degree but much experience, he/she calls himself an engineer and this is on their business card and job description. No one argues with the person because he/she is more experienced in the subject matter than the less experienced degreed

engineers.

It doesn’t make sense that all a person needs to do is take a specific set of undergraduate classes required to fulfill the obligation to become an engineer.

This point was asked of me from a very sharp soon-to-become engineering freshman asking about this topic. In my opinion, the critical step of formal licensure for engineers is missing in the U.S.

This critical step needs to be added similar to what is required for the M.D. and J.D. My rationale for making this statement is that I see C-level engineering students graduate and make significant design errors on safety-critical systems simply because they didn’t do so well in a class, are not experienced enough, etc.

Licensure (P.E.) requires that the engineer demonstrate essential competencies prior to designing a bridge, a building, a roller-coaster, or other systems having critical safety aspects in the design. Some companies hire only Licensed P.E.s for that reason; however, other companies do not...and this is the issue.

David W. Clark, P.E., PA A ’86

Fallen Star

• Like some others, I was immediately struck by the resemblance of the Fallen Star cottage (*Fall 2016 Bent*) to a house which had been deposited by a tornado in a very strange place, perhaps part of the allegory Mr. Suh was trying to draw to the experience of many foreigners arriving in the U.S.

Unfortunately, most of Suh’s front-entrance level artistry is not visible to the vast majority of people passing on the sidewalk below; they see mostly a tilted exterior and concrete slab which evokes little positive emotional participation. What should the artist have done to integrate an essential part of the American experience—the feeling of separation from a previous culture?

Create a phony trapdoor in the parlor or a fake side door such that people looking in the front door and up from the sidewalk below would see a figure of a girl and her little

dog looking down in amazement at Southern California. To paraphrase the classic line—Do Ho, I have a feeling you’re not in Korea anymore.

James E. Fahs, DE A ’83

Balsa Bent Beginning!

• As I approach my 100th birthday (June 23, 2017) and have been a member of Michigan Alpha since March 1948, it occurs to me that memories of my selection may be of interest.

It started with a letter informing me that my GPA was adequate to apply for membership in Tau Beta Pi and that if I wished to apply, I should come to the campus carpenter shop at a designated time. I did so with about 20 other men—no females, of course, none were ever in any of my engineering courses.

We were each handed a block of balsa wood and instructed to carve out a Bent and wear it, attached to a scarf, to classes until further notice.

After a week or so, we met again

(Continued on page 30)

Statement of Ownership, Management & Circulation

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I certify that the statements made above are correct and complete.

—Curtis D. Gomulinski, Editor

About Numbers

How these Basic Tools Appeared and Evolved in Diverse Cultures

By Allen Klinger, Ph.D., New York Iota '57

MANY BIRDS AND insects possess a “number sense.”¹ “If ... a bird’s nest contains four eggs, one may be safely taken; but if two are removed, the bird becomes aware of the fact and generally deserts.”² The fact that many forms of life “sense” number or symmetry may connect to historic evolution of quantity in different human societies. We begin with the distinction between cardinal (counting) numbers and ordinal ones (that show position as in 1st or 2nd).

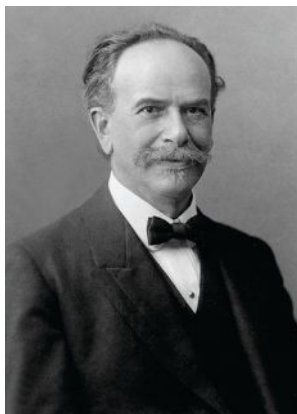
Humans sought greater understanding of numerical properties to better deal with daily occupations. One means of representing numbers uses the fingers. The matching principle involved in indicating a finger for each object is called one-to-one correspondence. The importance of man’s ten fingers in numeration is indicated by the fact that “... those savages who have not reached the stage of finger counting are almost completely deprived of all perception of number.”¹

First Attempts

The cardinal concept implied in matching was the basis of the first attempts to keep a record of number. Pebbles or sticks were cast into a pile, notches cut in wood or knots made in cord. The early origin of written number records is shown by pieces of carved bone. Making a notch on a

bone with a carved head of some particular animal at the end, is almost recording a word message like “taken, one more such animal.”

Etymology indicates how recently our ancestors made use of these simple methods of recording number. Tally comes from the French *tailler*, to cut, which was derived from the Latin *talea*, a stick or cutting. Similarly, *calculate/calculus* come from the Latin word for pebble— *calculus*.



Franz Boas

AUTHOR’S NOTE

The original version of this article is on the web at <http://web.cs.ucla.edu/~klinger/number.pdf>

It was written when I was a freshman. The humanities course had an assignment to write a paper on anthropology. The instructor approved the topic “number in early man.”

At a reunion in 1997, I met a classmate from 1954, who remembered my paper from the same year. As a pack rat, somehow I found the original.

The Bent offers this to encourage exploring topics outside the engineering curriculum.

Key words: History and Civilization, Number Words and Base, Calculation.

Representation of quantity by the principle of one-to-one correspondence was undoubtedly accompanied, and perhaps preceded, by creation of number-words. These can be divided into two main categories: those that arose before the concept of number unrelated to concrete objects, and those that arose after it.

An extreme instance of the development of number-words before the abstract concept of number is that of the Tsimshian language of a tribe in British Columbia. This language has seven distinct classes of number-words: for flat objects and animals, round objects and time, long objects and trees, men, canoes, measurements and, as a recent development, for counting when no definite object is referred to.¹ This was

shown in studies by German-American anthropologist Franz Boas.³ In a like manner, the English language has many words for types of collections (set, flock, herd, lot, bunch, etc.) but the more general collection and aggregate are of foreign origin.

Another peculiarity of English, the many words for two things, led to the comment, “It must have required many ages to discover that a brace of pheasants and a couple of days were both instances of the number two.”⁴

Some number-words developed as an abstraction of a general quality of quantity. That is the case of number word *five*. It had the original meaning *hand* in many languages: *pantcha* was five in Sanskrit—modern Persian uses *pentcha* for hand; five in Russian is *piat*—*piast* is Russian for the outstretched hand.

Abstract Nature

Many societies found it difficult to develop number-words besides “one,” “two,” and “many.”

The idea of number as opposed to the number of a specific set of things was not completely comprehended in early societies even when there was but a single word to express a particular quantity. The collection word for five brought forth the image of a hand (or another group of five objects). This image was compared with the set of things whose number was to be determined.

The difficulty in grasping the idea of the abstract nature of number may lie in its being a logical, rather than numerical, concept. Some experiments with children

RIGHT: The Maya numbering system of dots and dashes is shown in this page of a pre-Columbian Maya book of the 11th or 12th century. It is believed to be a copy of an original text of some three or four hundred years earlier, and is the oldest book written in the Americas known to historians. It is located at the Saxon State Library in Dresden, Germany.



Jean Piaget

performed by Swiss psychologist Jean Piaget seem to indicate this.⁵

When a child is asked to lay out a number of blue chips equal to the number of red chips that are in a row spaced at uniform intervals, his reaction will depend on his age. If the child is five or younger, he will lay out a row of chips of the same length as the model row but will disregard spacing (placing them very close to each other) indicating that he believes the number of them is the same if the lengths of the

rows are equal. At the age of six, the child will match his chips to those on the table. But if the length of one row is increased (by changing the spacing) he believes that row has more than the other. A third stage is reached by the time the child is six-and-a-half to seven: he realizes that the number of chips is independent of their spacing. "In short, children must grasp the principle of conservation of quantity before they can develop the concept of number."

Numeration would be a cumbersome process if it were necessary to form model collections and special words for every number. Fortunately, that is not the case because of the principle of forming large numbers by combining smaller ones. The last simple number is known as the *base* or *radix* of its number system. Our system is decimal: all numbers after ten are compounded of the first ten numerals (eleven and twelve are compound numbers whose forms are unrecognizable because they are Anglo-Saxon in origin.)

Primitive Language

Among the bases in use are two, three, four, five, six, eight, ten, twelve, twenty, and sixty. Of these, the most common today are five, ten and twenty.

The decimal base mechanism follows from the literal meaning of eleven in a primitive language: a man and one on the hand of another man. Of the non-decimal number systems, a typical binary system is that of a tribe of the Torres Straits between Australia and New Guinea:

- | | |
|------------------|------------------------|
| (1) urapun | (4) okosa-okosa |
| (2) okosa | (5) okosa-okosa-urapun |
| (3) okosa-urapun | (6) okosa-okosa-okosa |

A typical quinary system is that of the Api language of the New Hebrides:

- | | |
|-----------------|----------------------------|
| (1) tai | (6) o tai (other one) |
| (2) lua | (7) o lua (other two) |
| (3) tolu | (8) o tolu (other three) |
| (4) vari | (9) o vari (other four) |
| (5) luna (hand) | (10) luna luna (two hands) |

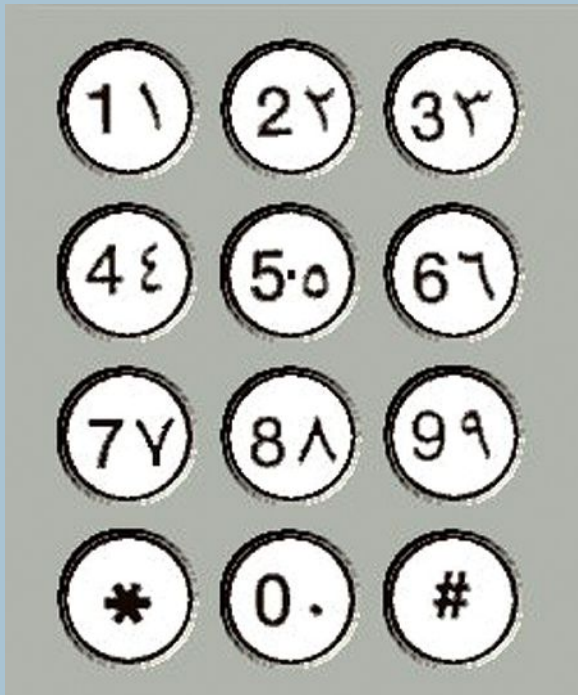


Quinary, decimal and vigesimal number systems arose from finger counting, the "whole man" being regarded, respectively, as a hand, both hands, or the hands and feet. Binary systems are probably based on the symmetry of man's body; a Brazilian tribe developed a tertiary number system because they counted on the joints of the fingers; the quaternary system arose in California because of the religious significance of the four quarters of the sky. A system using eight basic numbers arose because counting was performed on the spaces between fingers not on the fingers themselves.

Apparently the simplest system, the binary, was adopted initially and discarded in favor of a system of higher radix in many parts of the world. The need for a system using a higher base arises from the difficulty of expressing large numbers in the binary system. The decimal and quinary systems have developed and been rapidly adopted in regions that previously used simpler systems of numeration. The existence of remnants of other number bases in our decimal system is readily ap-



YBC 7289 is an Old Babylonian clay tablet (circa 1800–1600 BCE) from the Yale Babylonian Collection. An approximately 8-cm diameter hand tablet, it appears to be a practice school exercise undertaken by a novice scribe. But, mathematically speaking, it is one of the most fascinating extant clay tablets because it contains not only a constructed illustration of a geometric square with intersecting diagonals, but also, in its text, a numerical estimate of $2\sqrt{2}$ correct to three sexagesimal or six decimal places. The value is read from the uppermost horizontal inscription and demonstrates the greatest known computational accuracy obtained anywhere in the ancient world. It is believed that the tablet's author copied the results from an existing table of values and did not compute them himself. The contents of this tablet were first translated and transcribed by Otto Neugebauer and Abraham Sachs in their 1945 book, *Mathematical Cuneiform Texts* (New Haven, CT: American Oriental Society). Photos: Bill Casselman, www.math.ubc.ca/~cass/euclid/ybc/ybc



Modern-day Arab telephone keypad with two forms of Arabic numerals: Western Arabic/European numerals on the left and Eastern Arabic numerals on the right

parent: having sixty minutes in an hour, dozen and gross, and the Biblical “three score and ten” are among the many examples.

Examination of the number base from a mathematical standpoint yields several criteria for a satisfactory radix: it should be sufficiently large to express large figures concisely, but small enough to lessen the words to be memorized to a reasonable amount. The next quality is how factorable the base should be. Mathematicians are divided on this point. Some favor a prime number so as to eliminate the ambiguity that arises in the expression of fractions ($3/25$ represents itself, $6/50$, $12/100$, etc.). This type of radix makes all decimals non-terminating (e.g. $1/3 = 0.3333 \dots$) and is impractical from the standpoint of everyday use.

Other mathematicians favor a base that is evenly divisible by many numbers. The radix fulfilling the other requirements and that of factorability best is twelve. A duodecimal system would employ two additional symbols (e.g. X for ten and L for eleven) and would represent 12 by 10, 144 by 100, etc. The many factors of twelve simplify calculations by making quotients “come out even” more frequently and facilitate mental calculations: if a number ends in 0 in the decimal system we know it is divisible by 2 and 5; if it ends in 0 in the duodecimal system we know that it is divisible by 2, 3, 4, and 6. At any rate, ten would not be used as the mathematically chosen radix since it is neither prime nor highly factorable.

The universal need for describing quantity led to representation by one-to-one correspondence, development of number words, and a method for limiting the amount of words needed to express large figures. An important contribution to this was the development of a group of symbols.

Written numeration is probably as old as private property. There is little doubt that it originated in man's desire to keep a record of his flocks and other goods. Archeological researchers trace such records to times immemorial, and they are found in the caves of prehistoric man in Europe, Africa, and Asia. Numeration is at least as old as written language, and there is evidence that it preceded this. Perhaps, even, the recording of numbers suggested the recording of sounds.¹

First Written Numbers

The first written numbers that were not solely tally marks probably occurred in Egypt about 3,400 B.C.⁶ The Egyptian numerals employed the tally principle, as did most early systems, and were mainly straight lines. The distinction between simple tallying and the Egyptian numeration is made because the Egyptians used special symbols to signify large quantities. The Egyptians had basic symbols for one, ten, one hundred, and other powers of ten. The value of a number was the sum of the values of the symbols comprising it, the value of a symbol being repeated the number of times that the symbol was repeated.

Another system was the cuneiform symbols developed in Mesopotamia about 3,000 B.C. The system used by

the Babylonians was both sexagesimal and decimal. Ordinary computation was carried on in the decimal system and astronomical work in the sexagesimal. The Babylonians used the wedge-like imprint that the stylus made in the clay as one, sixty, three hundred sixty, and, in general, sixty raised to any power, the meaning of the symbol being derived from the context. Similarly, the symbol for ten served as ten times sixty raised to any power.

As a later development, the Babylonians attempted to eliminate the indefinite representation that their system produced. In lists where we make the entry '0', as an alternative to leaving blank, the Babylonians in some cases make use of the sign *ul*, meaning 'not,' 'nothing.' The Babylonian "zero" was a punctuation mark like our dash. About 400 B.C., the Babylonian mathematician Naburianu realized the significance of *ul* and used it as we use our zero. This development was lost to the world because it was in the sexagesimal system which was incomprehensible to the neighboring peoples who used decimal systems.²

The Greeks and Hebrews used fundamentally different numeration systems. Both were derived from the Phoenician; they followed an ordinal scheme of written numbers. Each of these civilizations used alphabetic elements—letters—to represent numbers. The Greeks originally represented numerals by the initial letter of the number word, but adopted the Phoenician convention of using the letters of the alphabet in their natural succession to represent numbers. The first nine letters of the Greek alphabet were, successively, symbols for one through nine, the next nine represented ten and its multiples through nine hundred (the Greeks added three letters to their alphabet in order to have twenty-seven symbols).

Return to Cardinal

The Roman numeral system was a return to the cardinal principle, and was similar to the Egyptian. Two interesting theories have been proposed to explain the derivation of the Roman symbols for five and ten. The first considers the symbol for ten as two fives. This theory is based on the fact that the Roman "V" is heavier on the left side. Consequently, the five is regarded as a hand. The idea is that the left side of the symbol represents the four fingers and the right side the thumb. The second theory is based on the tallying origin of cardinal systems of numeration: "X" is considered an abbreviation for "||||||| over written by a /," and "V" is understood as one half of "X."

While these number systems were developed in the Old World, the Mayan Indians of the Yucatan Peninsula developed a vigesimal system which employed place notation. The Mayans wrote numbers in vertical columns, using only three symbols: . (one), _ (five) and (a version of an oval) (zero). Symbols on the lowest level were units, the next higher



As a simple, cheap and reliable device, the Russian abacus remained in use in shops and markets throughout the former Soviet Union. Its use was taught in most schools until the 1990s.

level, multiples of twenty, and successively, multiples of 360 and 7,200. One could try to represent these four examples 11, 60, 47, and 723 following Mayan three-symbol notation.

It is interesting to note the pebble and stick form that the Mayan system takes. The use of "stick" or straight line numerals was extremely common. The Egyptian and Roman symbols were vertical lines but horizontal forms were used in the Far East. Our "2" and "3" are derived from the cursive forms of the corresponding horizontal line symbols, "z" (two horizontal lines, one on top of the other, joined by an oblique line) and three horizontal lines stacked together.

Each of the systems of written numbers that we have discussed are different from our system in one major respect: they were used to record figures but were not used directly in calculations. A primitive calculating instrument, the abacus, was used in one form or another in almost every civilization. The abacus was a method of representing numbers in a positional notation. Reduced to its basic elements, the abacus consisted of a set of parallel columns. The columns successively represented units, tens, hundreds, etc. Counters were placed on the columns (or marks made on columns in the dust) to indicate how many units, tens, or hundreds there were in a number. How would the number 13,204 be represented on an abacus?

The abacus was used in calculations by adding figures to their appropriate column and transferring when the marks in a column exceeded nine. Addition and subtraction as performed on the abacus can be easily visualized, but the processes of multiplication and division are too involved to be discussed here. A basic method for multiplication, "duplation," was used in Egypt at an early period (c. 3,400 B.C.) and was extremely important in Europe, surviving until the Renaissance period. Using

our notation, multiplication of 32 by 17 using duplation was accomplished in this manner:

$$\begin{array}{rcl}
 1 \times 32 & = & 32 \\
 2 \times 32 & = & 64 \\
 4 \times 32 & = & 128 \quad (4 \times 32 = 2 \times 64) \\
 & & [1 + 2 + 4 = 7] \\
 8 \times 32 & = & 256 \\
 2 \times 32 & = & 64 \\
 & & [7 + 8 + 2 = 17] \\
 17 \times 32 & = & 32 + 64 + 128 + 256 + 64 = 544
 \end{array}$$

Division was accomplished by the analogous “mediation.” These processes were taught in universities, one



Pierre-Simon, Marquis de Laplace

institution excelling in their course in mediation, another in duplation. The product of thousands of years of civilization was an inflexible number system “so crude as to make progress well-nigh impossible” and “a calculating device so limited in scope that even elementary calculations called for the services of an expert.”⁸

In India the use of a cardinal system of numbers made the abacus a fundamental tool. It was, however, difficult

to record counting-board operations: the figure could represent 32, 302, 320, and so on. In order to make an unambiguous record of a series of calculations it became customary to place a mark called *sunya* (meaning empty or blank but having no connotations of void or nothingness) to indicate an empty place on the abacus. The symbol used was 0, o, or . and was eventually accepted as a number itself. It was placed at the bottom of the ordinal series 1, 2, 3, ... and was adopted by the Arabs along with the rest of the Indian numerals.

Greatly Simplified

The Arabs, of course, introduced their numbers to Europe. The Hindu-Arabic symbols greatly simplified all calculations; their effectiveness is illustrated by multiplication. The example that required the services of an expert in duplation is within the capability of most children because of the new numerals. The method used in multiplication involves separating one of the numbers to be multiplied into units and tens, multiplying each of these quantities by the second number and adding the partial products:

The French mathematician Pierre-Simon, Marquis de Laplace, commented on the Hindu-Arabic numerals by saying:

“It is India that gave us the ingenious method of expressing all numbers by means of ten symbols, each

symbol receiving a value of position as well as an absolute value; a profound and important idea which appears so simple to us now that we ignore its true merit. But its very simplicity and the great ease which it has lent to computations put our arithmetic in the first rank of useful inventions; and we shall appreciate the grandeur of the achievement the more when we remember that it escaped the genius of Archimedes and Apollonius, two of the greatest men produced by antiquity.”⁷

Our modern unambiguous place notation was developed to serve practical needs. It was originated in three places: Mesopotamia, India, and the Yucatan Peninsula. The last step, recognition of zero as a number by the public, took place only in India.

We have seen the development of cardinal and ordinal number concepts, the creation of the number word, the grouping of numerals by using a base, the use of simple symbols, the discovery of the principle of place notation, the development of a symbol for the absence of a digit, and the recognition of zero as a number with which computations may be made. Each step was important in producing our arithmetic, a fundamental tool.

NOTES

This paper has a few of the citations from 1954: for more, please see the online pdf. In asking a reader to respond to questions it presents issues about number representations that appear in the original work. Any that seem unclear can be resolved by consulting the scanned original work at:

<http://web.cs.ucla.edu/~klinger/number.pdf>

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Acknowledgement

• Robert J. Heilen, M.D., Cooper Union graduate, recalled “The Evolution of Number” while Dr. Gabriel F. Groner suggested sending it to *The Bent*.

Allen Klinger is a life fellow of the IEEE “for contributions to image processing by means of computers.” He received degrees from Cooper Union, Caltech and UC Berkeley, served as professor, engineering and applied science at UCLA



(prior posts as assistant and associate professor), and employment or consulting positions at Rand, Aerospace, JPL, World Bank and other organizations. His three book publications, encyclopedia articles, and research papers cover many optic and image issues. He is specifically known for work in data structures and algorithms, and human-machine interaction.

President Blackford Reports to the 2016 Convention

I WANT TO START by showing you the organization chart for Tau Beta Pi.

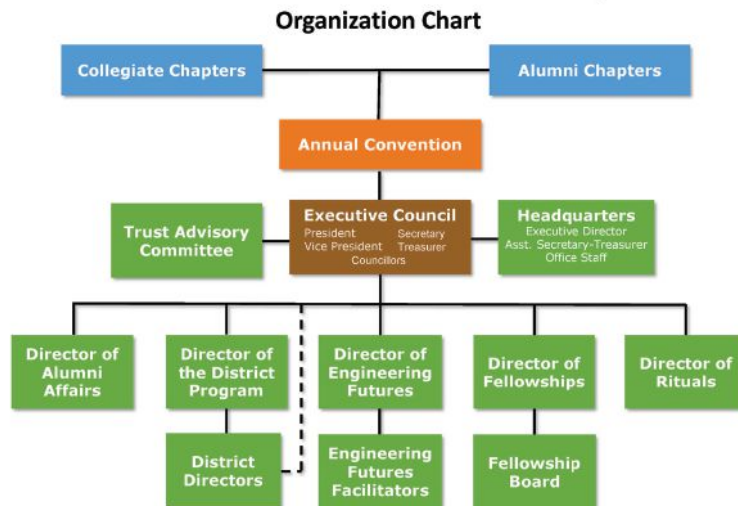
You will notice one key characteristic: as the representative of the collegiate and alumni chapters at Convention, you are the leaders of Tau Beta Pi. The Convention is equivalent to a meeting of the shareholders of a company; you are here to set our policies and direction. I am proud that

we are a student run organization, with the Executive Council leading the organization between Conventions and providing overall management and expertise. Please take your role as leaders in this student run organization seriously and review the material you are voting on and debating as you are making decisions for and representing all 570,000 members.

When I went to the District 10 Conference this past spring, my update on the activities of the Council was called *The State of the Association Address*. As I live in Washington, DC, I very much enjoyed the analogy and think it is as appropriate here as you are the deliberative/legislative body of TBPi and will be making the “laws” and policy for our Association.

While there is less pomp and circumstance here than on Capitol Hill (there was no Sergeant at Arms to announce the President of Tau Beta Pi, no member of the EC needs to be moved to a bunker in an undisclosed location, and I hope that no one will scream “you lie” at any point during my report), nonetheless, I am pleased to present an overview of what the Executive Council has accomplished this past year and our plans for the future.

In short, Tau Beta Pi is as strong and active as ever, and we owe that to all of you here at Convention and others who could not join us—the student chapter leaders, alumni chapter leaders, chapter advisors, the dedicated volunteer Association Officials, the Headquarters staff, alumni who are here to impart their knowledge through professional development sessions, the recruiters and graduate school representatives participating in our Recruiting Fair, our award recipients whose accomplishments are a testament to what is possible to achieve as a Tau Bate, and the members of the petitioning society who are eager to join our Association. We also owe our success to all of our members—you are the face of Tau



Beta Pi and your pride in membership will increase our visibility and recognition in the engineering profession and beyond. All of you play an essential role. I encourage those of you who are students to continue your involvement after you graduate and our alumni to continue lifelong engagement.

There is one other group of individuals who I need to recognize, for without

their support, none of the programs and opportunities of membership would be possible. Our scholarships and fellowships, this Convention, District Conferences, the Engineering Futures program, and even the low cost of your lifetime membership dues is made possible through our generous donors. All donors have purple ribbons on their badge; please take the opportunity to thank them for their generous support. I hope that, when circumstances allow, you will consider joining them in supporting our Association so that future Tau Bates will have the same—and even more—opportunities.

It is a privilege to lead the largest engineering society, and one that not only recognizes academic achievement and integrity, but is also active in the community and on campus. We will present Chapter Project Awards and Chapter Excellence Awards at Convention to recognize the outstanding activities of our campus chapters and to recognize exemplary performance. We welcome one new chapter to our Association—NC Z at East Carolina University—which I had the honor of installing in March. We have representatives from the petitioning society at Brigham Young University-Idaho, which seeks to join. We welcome new and reactivated alumni chapters, and continuing the welcoming theme, last year, we initiated nearly 10,000 members, the largest class in nearly 20 years. I hope that we exceed that number this year so that we can recognize even more deserving engineers.

The Executive Council has been busy. Last April, you ratified changes to our Constitution and Bylaws to restructure the EC, expanding its size and changing the term lengths and frequency of elections. You will be electing three new members to the Executive Council this year and Councillor Holl has already introduced you to the candidates who have so far indicated their intent to run for election.

The Executive Council has made great strides, with the help of an outside consultant, on formulating a mission, vision, and strategic plan for our Association. You will see evidence of our new vision and mission at this Convention and it has been presented in *The Bent*, but, let me share it again with you now:

Our Vision

Tau Beta Pi Engineers Making Extraordinary Contributions to Create a Better World.

Our Mission

As the only honor society for engineers in all disciplines, Tau Beta Pi:

- Recognizes academic and professional excellence rooted in personal integrity,
- Promotes a well-rounded education essential for success,
- Provides opportunities for leadership development and promotes lifelong learning,
- Cultivates a community of dedicated high achievers.

I would also like to share the highlights of our strategic plan. This plan has not been created in a vacuum—we have solicited the input of Association Officials, alumni, and the attendees at the 2015 Convention.

We have identified the following Strategic Goal Areas:

- Enhancing the Image, Visibility, and Branding of Tau Beta Pi
- Strengthening the Finances and Fundraising of the Association
- Advancing Collaborative Member Engagement
- Providing Relevant and Recognized Leadership and Professional Development
- Developing the Organizational Processes of the Association
- Improving Chapter Support and Operations

A survey for all members is available and a link to it was published in *The Bent* to solicit the input of all members to help refine our plan as we look to implement it over the coming year. I welcome your feedback and comments as these areas will guide our programs and projects.

We have made a number of changes to the San Diego Convention:

- Our Professional Development program has been expanded and we have made schedule changes to give more opportunities for voting delegates to participate.
- We will have a more informal welcoming poolside BBQ tonight and closing dinner in a park near the water, as well as entertainment by Only Won, Larissa Lam, and Don McMillan.
- We have changed the committee scheduling and size. I

encourage all of you who were not assigned to a committee to go to the meetings tonight starting at 7:30 p.m. and learn about the business that has been discussed.

- We again have our Recruiting Fair tomorrow. Please visit these supporters, both employers and grad schools. If any of you have contacts or suggestions for companies or graduate schools to include at next year's fair, please let us know.

The Council is also continuing to revise our governing documents. Executive Director Gomulinski and I have been meeting regularly to make revisions as guided by discussions of the Governing Documents Revision Committee and the EC. The Constitution and Bylaws Committee will be reviewing these revisions to prepare them for consideration by the 2017 Convention.

Our governing documents last underwent major changes nearly 50 years ago, and are among the longest of any honor society. The idea behind the current revision is not to make substantive changes, but to streamline them and remove items, such as fines for not submitting reports in a timely manner, that would be better relegated to policy (approved by Convention).

Even if you are not on the Constitution and Bylaws committee, I encourage you to review these documents and make suggestions. With these revised documents, we hope to not need to make annual changes to our governing documents, especially for such trivial matters as reimbursement for travel via Pullman train car!

The Constitution and Bylaws also require me to announce to the Convention the salary of our Executive Director; however, unless there is objection, I will simply state that that information is available on Tau Beta Pi's IRS form 990 for anyone who is interested.

The Council received 24 recommendations during the New Business portion of the 2015 Convention and I have responded individually to all of them. Our responses are also available on the TBPi website for anyone interested in reviewing them. We are always open to receiving your recommendations at any time.

I am confident that all of you, as the leaders of your chapters, will be making extraordinary contributions here at Convention, back at your chapters, and throughout your career as together we create a better world. I look forward to meeting all of you at Convention. I remember well my first Convention in Rapid City, SD, nearly 20 years ago and the fellow Tau Bates that I met there and remain in contact with to this day. While there will not be a blizzard here in San Diego or a snowman gracing this year's Convention picture, I know you too will long remember the fun times, new friends, and accomplishments at Convention.

Here at Convention, the alumni chapters have buttons that say: "Tau Beta Pi for Life." I want all of you to remember that you are members as long as you live. I encourage you to join an alumni chapter, advise a collegiate chapter, volunteer at a MindSET event, or even

(Continued on page 31)

San Diego hosts the 2016 gathering Tau Beta Pi's 111th Convention

THE 111th Convention of Tau Beta Pi was held in San Diego, CA, October 6-8, 2016. These 503 members represented 230 collegiate chapters and 29 alumni chapters on behalf of the entire organization. Of the total, 325 were students and 164 were alumni. Chapter advisors totaled 28, some partially reimbursed by Tau Beta Pi. An additional 96 non-member guests, recruiters, and consultants participated in Convention activities and enjoyed the hospitality of San Diego.

California Xi, California Psi, California Alpha Epsilon, and the Greater San Diego Alumni Chapter hosted the Society's first annual meeting in southern California in 35 years and the first in San Diego. The Arrangements Chair was **Arianna N. Lasche**, CA M '13, who led the host committees in such duties as transportation, publicity, and hospitality.

Headquarters for this Convention was the Town and Country Resort and Convention Center. Six meals were provided, and all meetings were held in the Convention Center. Comprised of 41 booths hosted by recruiters from graduate engineering programs and corporations, the Recruiting Fair enhanced Friday's activities.

This year's event included the typical activities but also included many new features. Committee meetings commenced on Thursday morning prior to the official opening of Convention on Thursday afternoon. Four business meetings were held, beginning with Thursday's session when the President's Report for the Executive Council was presented. Following the first meeting, attendees enjoyed an informal outside Welcoming BBQ, where they could enjoy the weather and scenery. Friday featured the presentation of the 2016 McDonald Mentor and Outstanding Advisor during the evening banquet followed by a concert by **Baldwin B. Chiu**, P.E., CA Y '98, who goes by the stage name "Only Won." The Alumni and Chapter Awards Banquet on Saturday afternoon brought Convention business to a close when the 2016 Tau Beta Pi Laureates, Distinguished Alumnus, and chapter award winners were honored. Following the banquet, **Don P. McMillan**, PA A '81, entertained attendees with his comedy routine entitled "Engineer@Heart." Delegates enjoyed a final opportunity to socialize with a picnic in the park that featured food trucks and games at sunset.

Almost all business at TBPi Conventions is handled by committees. Seven standing committees are called for in

the Constitution, two *ad hoc* committees were appointed, and half of the collegiate and alumni chapter voting delegates served on a committee.

Full details of the business meetings are recorded in the official minutes posted on the Convention website, www.tbp.org/conv/2016/conv.cfm. Major actions of the Convention are reported in this article.



One New Chapter Granted

In response to a petition received during 2016, one new collegiate chapter of Tau Beta Pi was granted by the Convention. The successful petitioning society was the local engineering honor society at Brigham Young University-Idaho, which was represented by one student officer and one faculty advisor. Installation ceremonies are planned for Idaho Delta this spring. This will raise the number of active collegiate chapters to 246.

The Petitions Committee also considered a proposal to allow chapters to be approved by the Executive Council. After a lengthy discussion, the Convention voted to leave the existing petitioning process in place.

Constitution & Bylaws

The Constitution and Bylaws Committee diligently worked through three items including reviewing the status of the general revision to the Constitution and Bylaws and modifying the requirements to receive a fellowship. The Convention amended the Bylaws, by the required three-fourths vote, to allow partial-term fellowships; this change became effective immediately.

ABOVE: **Peter W. Likins**, Ph.D., CA I '57, former president of Lehigh University and the University of Arizona welcomes attendees. BELOW: Delegates socialize at the Thursday Welcoming BBQ held outdoors at the Grand Pavilion. Unless otherwise noted, Convention photos by **Christopher "Kiffer" J. Creveling**, UT A '13.





Delegates listen and learn the "applau" while being introduced to the Association Officials during the First Business Meeting.

The committee's final item of business dealt with leftover issues resulting from the Executive Council restructuring approved in 2015. The Convention voted, by the required vote, to amend Article III, Sections 2 and 3 to (1) grant Convention the authority to set the size of the Executive Council, (2) clarify when a member can be re-elected, and (3) refine the nomination and election process. Final approval of these changes is subject to chapter ratification.

Financial Affairs

Understanding the complexity of Tau Beta Pi's financial status presents challenges to students, but the Chapter and Association Financial Affairs Committee democratically reviewed all financial matters and concluded that the Association's financial health is in proper order.

The committee recommended, and the Convention adopted, specific allowable Convention expenses beyond those specified in the Bylaws for delegates to the 2017 meeting and increased the allowed en-route breakfast reimbursement. The group worked effectively with chapters to resolve debts and reviewed the 2014-15 & 2015-16 auditor's report, the 2015-16 report of the Executive Director, and the budget for 2015-16. The Convention approved, on the recommendation of the committee, an unusual child care reimbursement request. They made recommendations for reimbursement of expenses for advisors and non-voting delegates to attend Convention.

Initiation

The Rituals Committee organized an impressive model initiation ceremony for 3 students, 1 alumna, and 1 eminent engineer of California Xi and Psi. The Convention made no change to the Ritual but did approve a special accommodation to have a sign language interpreter attend the model initiation for a student member.

Awards

The Awards Committee worked long hours in reviewing the 2015-16 records of the chapters and in selecting the recipients of the R.C. Matthews Outstanding Chapter Award, the R.H. Nagel Most Improved Chapter Award, and the J.D. Froula Most Improved Membership Award. Announcement of these awards and the 17 honorees of the Chapter Performance Scholarship Program are reported in detail on pages 20-21.

Future Conventions

The 2016 Convention reviewed proposals from three cities to host the 2018 and 2019 Conventions. The invitation from Colorado Alpha, Beta, and Epsilon and the Front Range Alumni Chapter to host the 2018 Convention in Denver was accepted; the invitation from Ohio Gamma to

host the 2019 Convention in Columbus was also accepted.

2016 Tau Beta Pi Laureates

The attendees enjoyed both meeting and hearing about the diverse achievements of Laureates **Nathan J. Ferraro, OK A '16**, **Angadbir S. Sabherwal, IA A '16**, and **Kiersten K. Wang, FL A '16**. Councillor Alan J. Passman presented commemorative plaques and \$2,500 checks to each.

Tau Beta Pi-McDonald Mentor

The attendees met and learned about 2016 McDonald Mentor **Antonette "Toni" M. Logar, Ph.D., SD A '78**, a professor of mathematics and computer science at the South Dakota School of Mines and Technology. Councillor George J. Morales, Ph.D., presented her engraved commemorative medallion, \$1,000 check, and another \$1,000 for her chapter.

Outstanding Advisor

Everyone was pleased to meet the 2016 Outstanding Advisor **Sandra "Sandy" B. Pitzak, CO B '00**, owner and spacecraft engineer at Tomorrow's Enterprise, LLC, who serves as chief advisor to Colorado Beta. She has served as an advisor for over 15 years. Councillor Sue L.R. Holl, Ph.D., presented \$1,000 and a commemorative plaque to Sandy and another \$1,000 for the University of Colorado college of engineering's discretionary fund.

Distinguished Alumnus

President Blackford cited the career accomplishments of the 2016 Tau Beta Pi Distinguished Alumnus Award



Murray E. Rudin, J.D., NY K '83, managing director of Riordan, Lewis, & Haden congratulates attendees on a successful Convention and shared words of wisdom during his farewell remarks.

recipients **Nancy "Jan" J. Davis**, Ph.D., P.E., *AL A '77*, vice president and deputy general manager of Jacobs Engineering and former NASA astronaut; **Eugene M. DeLoatch**, Ph.D., *DC A '59*, founding dean of the Morgan State University School of Engineering and past chairman of the department of electrical engineering at Howard University; and **Michael D. Griffin**, Ph.D., *MD B '77*, chairman and CEO of the Schafer Corporation and previous administrator of NASA. Drs. Davis and Griffin were unable to attend Convention. President Blackford presented a commemorative plaque to Dr. DeLoatch, and a TBPi scholarship of \$2,000 will be given in honor of each to a student next summer.

Chapter & Professional Development

The Chapter Development Program included Interactive Chapter Exchanges (ICE) and district meetings. Many delegates expressed appreciation for the usefulness of the ICE sessions which included a brainstorming and problem solving session followed by an interactive session with outstanding chapters presenting and answering questions. This year saw the continuation of the popular professional development sessions conducted on Thursday evening and in parallel to the Recruiting Fair on Friday. Attendees were able to select from 22 different sessions ranging from "Building up Your Chapter Officers" to "Engineering a Career in Cybersecurity."

2017-19 Executive Councillors Elected

Six members ran to serve on the Executive Council. Each member was introduced, made presentations, and stood for election on Saturday morning. After several ballots, the Convention elected **Wayne B. Paugh**, Esq., *FL Γ '93*, **Mennatoallah M. Youssef**, Ph.D., *VA Γ '04*, and **George Youssef**, *NJ Γ '01*. [See biographies on page 7.] These new members will join the current five members and take office on January 1, 2017. The Executive Council serves as Tau Beta Pi's Board of Directors.

Other Business

The *ad hoc* Engineering Futures Review Committee met, reviewed the current program, and made a series of recommendations to Director of Engineering Futures Katy Colby to enhance the program.

The *ad hoc* Curriculum Review Committee examined appeals by five chapters to include five non-ABET/EAC curricula in their bylaws as eligible curricula for new members. The Convention granted the appeals from the Ohio Eta Chapter for their operations research graduate program; from the Colorado Alpha Chapter for their computer science program; from New York Alpha



Delegates enjoy some final time together at the "Picnic in the Park" held in the Spanish Landing Park at sunset on Saturday. Photo by **Leonard G. Filomeo**, *CA M '74*.

Assisted by . . .

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Worcester Polytechnic Institute

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The PhD Project

for their computer science program; and from Illinois Gamma for their applied mathematics program.

Finally, the Resolutions Committee recommended, and the Convention adopted a resolution authorizing the Executive Council to amend the Articles of Incorporation to meet any Federal, State, or IRS regulations. A resolution was also approved modifying the terms of the current Executive Councillors to align with the new structure. Councillors Passman and Pih's terms will expire on December 31, 2017; Councillors Blackford, Holl, and Morales's terms will expire on December 31, 2018.

The Resolutions Committee was also responsible for thanking the host chapter members, officials, generous alumni and sponsors, award winners, Headquarters staff, volunteers, and others for all the good things that happened to Tau Beta Pi during the year. The Chair of the Resolutions Committee, on behalf of the entire Association, concluded her remarks to Convention with a succinct inspirational message to the delegates:

In looking around this room and reviewing this impressive list of names, I am honored that I have the opportunity to stand among such engineering giants. Thank you for your time tonight and this weekend. We look forward to seeing you at the 2017 Convention in Dearborn, hosted by the Michigan Gamma Chapter.

Association Awards

Outstanding Chapter: DC Alpha

District of Columbia Alpha at Howard University was chosen as the recipient of the 2015-16 R.C. Matthews Outstanding Chapter Award.

The chapter was cited by the Convention Awards Committee for a clean water project in Haiti and for the fact that being a small chapter, they partnered with other groups. There was good member involvement with a strong core group. Original and collaborative events ranged from grad school workshops to tutoring children. DC Alpha staged “events I would go for” like advising freshmen and how to organize finances.

District of Columbia Alpha leaders for 2015-16 (Fall—Spring) were President Daniel O. Okegbu; Vice President Matthew A. Clarke; Treasurer Alexander G. Myrie; Recording Secretary Priya D. Jaglal; and Corresponding Secretary Anna-Kaye C. Barrett.

Advisors were Robert E. Efimba (Chief), Kimberly L. Jones, Peter A. Keiller, and Marlon M. Mejias.

An honorable mention was given to Alabama Epsilon at the University of South Alabama.



DC Alpha's current President C. Dianne Pat-Ekeji, left, accepts the R.C. Matthews Award from Awards Committee Chair Julia Zayan, Michigan Beta '17.

Improved Membership: N. Carolina Gamma



Current North Carolina Gamma President Henry Yuen, right, receives the J.D. Froula Award from Secretary-Treasurer Emeritus Froula.

The Headquarters staff and Executive Council established the J.D. Froula Most Improved Membership Award in 2011 to honor the retiring Executive Director, Secretary-Treasurer, and Editor.

Mr. Froula presented this year's award to North Carolina Gamma at Duke University.

The award recognizes the chapter which has increased the number of electees initiated in each of the previous three years. Other considerations are the percentage increase and the number of initiates.

The Awards Committee noted that NC Gamma has initiated 73 members this past year, compared to 37 two years earlier.

North Carolina Gamma leaders for 2015-16 (Fall—Spring) were President Andrew G. Method, Vice President Xiping Bai, Treasurer Christopher P. Eckersley, Recording Secretary Xizheng Wan, and Corresponding Secretary John M. Bernabei.

Advisors were Michael R. Gustafson II (Chief), and John E. Dolbow

Honorable mentions were given to California Upsilon at California State University, Sacramento and North Dakota Alpha at North Dakota State University.

2016 Convention

Most Improved Chapter: Wisconsin Alpha



Current Wisconsin Alpha President Cassandra T. Bradley, left, receives the R.H. Nagel Award from Awards Committee Chair Julia Zayan, Michigan Beta '17.

\$8,500 in Scholarships

Seventeen chapters, each of which received Chapter Project Awards for three consecutive years, won \$500 scholarships.

CHAPTER	INSTITUTION	DELEGATE
ALABAMA EPSILON	UNIVERSITY OF SOUTH ALABAMA	MARINA SWANPEOEL
ALASKA ALPHA	UNIVERSITY OF ALASKA FAIRBANKS	BRYCE HILES
CALIFORNIA ALPHA	UNIVERSITY OF CALIF., BERKELEY	WESLEY GUO
CALIFORNIA EPSILON	UNIVERSITY OF CALIFORNIA, L.A.	ALEXANDER SOROKIN
DC ALPHA	HOWARD UNIVERSITY	C. DIANNE PAT-EKEJI
FLORIDA ALPHA	UNIVERSITY OF FLORIDA	FELIPE CARVALHO
FLORIDA THETA	FL. INTERNATIONAL UNIVERSITY	DANIELA GIL
IOWA ALPHA	IOWA STATE UNIVERSITY	ANTHONY LOCURTO
MICHIGAN GAMMA	UNIVERSITY OF MICHIGAN	RACHEL NEUMANN
MICHIGAN EPSILON	WAYNE STATE UNIVERSITY	MAX SYDORCHUK
MICHIGAN THETA	OAKLAND UNIVERSITY	MATTHEW BLOOM
MICHIGAN KAPPA	WESTERN MICHIGAN UNIVERSITY	CHRISTIAN BROWER
NEW YORK TAU	BINGHAMTON UNIVERSITY	BRIAN PARSONS
OHIO IOTA	OHIO NORTHERN UNIVERSITY	ALEXANDER STRIMBU
PUERTO RICO ALPHA	UNIVERSITY OF PUERTO RICO	FRANCES RUIZ-DELIZ
S. CAROLINA ALPHA	CLEMSON UNIVERSITY	ELIZABETH ZANIN
TEXAS ALPHA	UNIVERSITY OF TEXAS AT AUSTIN	ANDREW YEANG

The R.H. Nagel Most Improved Chapter Award was established in 1971 to recognize major improvement in chapter development.

The 2016 recipient was the **Wisconsin Alpha** Chapter at the University of Wisconsin-Madison.

The Awards Committee recognized that the chapter had improved the level of their organization and increased project reporting. There were fewer projects but lots of time was devoted to those they did undertake. Wisconsin Alpha made a point of organizing industry speakers for their events. It all added up to a sustained improvement.

Leaders for 2015-16 were President Kelley Korinek; Vice President Michael A. Mason Jr.; Treasurer Cassandra T. Bradley; Recording Secretary Rachel K. Reiter; and Corresponding Secretary Emily M. Keuler.

Advisors were Darryl G. Thelen (Chief), Kelly E. Derauf, Kim Tam Dinh, and Anders M. Knight.

Honorable mentions were given to Maryland Delta at the University of Maryland Baltimore County and Vermont Beta at Norwich University.

Excellence Marked

Executive Director Curtis Gomulinski presented certificates to these chapters to mark excellence in their organization and administration:

Chapter Excellence Awards	Maryland Delta Massachusetts Eta Michigan Epsilon New York Theta New York Xi	Honorable Mentions
Alabama Alpha	North Dakota Beta	Georgia Beta
Alabama Delta	Ohio Iota	Illinois Alpha
Alabama Epsilon	Ohio Lambda	Illinois Delta
California Xi	Ohio Nu	Indiana Gamma
California Omega	Oklahoma Beta	Indiana Epsilon
Colorado Alpha	South Carolina Beta	Kentucky Beta
Colorado Beta	South Dakota Alpha	New Mexico Gamma
Colorado Delta	South Dakota Beta	Ohio Theta
DC Alpha	Tennessee Alpha	Ohio Mu
Florida Alpha	Texas Alpha	Oregon Gamma
Florida Epsilon	Utah Beta	Pennsylvania Beta
Florida Zeta	West Virginia Beta	Pennsylvania Mu
Illinois Beta	Wisconsin Alpha	Vermont Beta
Iowa Alpha		Wisconsin Beta
Maryland Alpha		

"THE BEST PEOPLE" JOB BOARD



Tau Beta Pi has a partnership with JobTarget to provide a job board for members and alumni. Check out current opportunities by visiting www.tbp.org/memb/jobBoard.cfm.

35 Chapter Project Awards

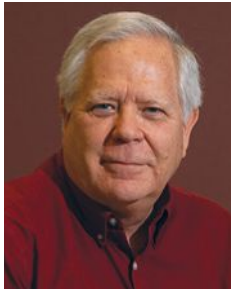
At the 2016 San Diego Convention, Chapter Project Awards for outstanding performance during 2015-16 were presented to the following chapters:

Ray Thompson, TBIT

CHAPTER / INSTITUTION	NO. PROJECTS	CHAPTER / INSTITUTION	NO. PROJECTS
AL E University of South Alabama • Held Tau Beta Pi Week events to raise awareness • Celebrated with a TBIT Ball	39	MD Δ University of Maryland, Baltimore County • Provided judges and referees for First Lego® League • Promoted interest in engineering for middle schoolers	36
AK A University of Alaska Fairbanks • Decorated the Bent for several different holidays • Volunteered at the local animal shelter	12	MA E Northeastern University • Took part in Relay for Life • Hosted the District I Conference	16
AZ A University of Arizona • Assisted at Honors reception with freshmen • Helped middle school girls 'Expand Your Horizon'	21	MI Γ University of Michigan • Helped Cub Scouts earn their engineering badge • These KnitWits prepared fleece mittens for needy	114
CA A University of California, Berkeley • Told students about the art of 'Surviving Engineering' • Professors took some 'Pies for Poverty'	74	MI E Wayne State University • Planted cherry trees as part of 'Greening of Detroit' • Went shopping for their adopted family at Christmas	49
CA Γ Stanford University • Made a 'Splash' reaching out to middle schoolers • Organized STAR banquet for college of engineering	31	MI Θ Oakland University • Volunteered at Baldwin Center with clothing, food • Collected Toys for Tots	18
CA E University of California, Los Angeles • Held 'Explore Your Universe' with hands-on exhibits • Explored earthquake engineering by seismic outreach	39	MI K Western Michigan University • Collected shoes for Fiji • Honored vets with Talons Out Honor Flights	24
CA H San Jose State University • Organized donations for Operation Christmas Child • Held Lunch & Learn about design of experiments	26	NM Γ New Mexico Inst. of Mining and Technology • Held a food drive for Puerto Seguro Home • Kept their piece of the highway clean	31
CA Ξ San Diego State University • Cleaned the beaches at South Shores Park • Engineering contest between members and candidates	35	NY T Binghamton University • Held engineering ethics discussion • Took a hike at the university nature preserve	25
CA T University of California, Irvine • Walked for Alzheimer's • Helped underprivileged immigrants become citizens	23	OH I Ohio Northern University • Participated in the Ada music fest • Made sure those in need had a Christmas	22
CA Ψ University of California, San Diego • Continued outreach to Florence Elementary • Helped River Restoration streamline cleanup	58	OH K University of Akron • Judged for the Akron Public School Science Fair • Public service as part of alternative spring break	17
DC A Howard University • Participated in MathCOUNTS • Held a 'Discovering Engineering' Family Day	56	PR A University of Puerto Rico • Collected books for the Dominican Republic • Walked in the "Marcha Rosada"	44
FL A University of Florida • Renovated a street as part of Project Makeover • Adopted a street	51	SC A Clemson University • Helped Habitat for Humanity build a house • Collected canned food	19
FL Γ University of South Florida • Welcomed back students by organizing block party • Tutored K-12 students with Outreach Program	21	TN A University of Tennessee • Organized Engineers Day for college of engineering • Conducted MindSET projects at local schools	24
FL Θ Florida International University • Held induction to the profession • Volunteered for nature preserve 9/11 Day of Service	41	TN Γ Tennessee Technological University • Built a wheelchair ramp • Volunteered at the Baja Race	17
IN Δ Valparaiso University • Help freshmen learn about Tau Beta Pi • Packed supplies for runners in Chicago marathon	11	TX A University of Texas at Austin • Collected trash along shoreline of Shoal Beach • Worked at UT Austin microfarm	63
IN E Trine University • Turned Christmas gifts project into annual event • Helped 'Introduce a Girl to Engineering'	12	TX E University of Houston • Helped out at the Houston Food Bank • Assisted at the Children's Museum	26
IA A Iowa State University • Held a Pi mile run • Helped middle school students 'Building the Future'	35	WI A University of Wisconsin, Madison • Talked about engineering in middle school counseling • Reached out with the Wonder of Physics	18
MD B University of Maryland • Made boxed lunches for homeless men's shelter • Helped staff booth at Science & Engineering Festival	36		



SYSTEM ADMIN TRANSITION



After 15 years of serving The Tau Beta Pi Association as system administrator and Convention photographer, Ray Thompson retired on August 17. Ray helped the Association enter the digital era by implementing our electronic chapter reporting system as well as many of the back-end systems that Headquarters uses on a daily basis. Bill Dickson joined the Headquarters staff as the new system administrator on April 26. Ray stayed on for four months to share his knowledge with Bill. Thank you Ray for your years of service to the Association, and enjoy your retirement. Welcome, Bill, to TBP!



Above: Ray Thompson
Below: Bill Dickson

ENGINEERING FUTURES

Consider becoming an Engineering Futures Facilitator (EFF)! EFFs serve as officials of Tau Beta Pi and, as such, facilitate Engineering Futures (EF) sessions that cover the following topics: People Skills, Group Process, Team Chartering, Analytical Problem Solving, and Effective Presentation Skills. EF sessions are sponsored by TBP collegiate chapters and are typically held at their campuses. During their first four years, all EFFs are expected to facilitate a minimum of five sessions per academic year (starting in year five, EFFs are expected to average ten sessions during a three-year appointment period). EFFs are reimbursed for all reasonable travel expenses when they are submitted to Headquarters within four weeks of incurring them. Candidates must be a member of Tau Beta Pi and have at least a bachelor's degree in engineering and a minimum of three years of full-time work beyond the degree. For a more complete job description, visit <http://www.tbp.org/other/EFF/jobDescription.pdf>. To apply, express your interest and email a copy of your resume to the Director of Engineering Futures, Katy Colbry, at colbryka@msu.edu.

ALUMNI CHAPTER NEWS



The **Research Triangle Alumni Chapter** held a reception on Sunday, October 23, at Tribeca Tavern in Cary, NC. Any alumni living in the Research Triangle area may join the alumni chapter. Contact Suzette Morales at tbp.rt.alumni@gmail.com to be added to their email list.

Alumni in the Dallas-Fort Worth area petitioned to charter a new alumni chapter. The Executive Council approved their petition in November. To join the new **Dallas-Fort Worth Alumni Chapter** and hear about their activities and plans for the future, email David Campbell at davidrcampbell@mavs.uta.edu.



The **Front Range Alumni Chapter** toured the National Wind Technology Center in Boulder, CO, on September 27 and hosted a happy hour at the Tivoli Brewing Company on November 17. Alumni in the Denver metro area up through Fort Collins and Loveland to Cheyenne and Laramie are invited to join the chapter. Contact President Kyle Adams at frtbppresident@gmail.com.

Join an alumni chapter near you! Contact Director of Alumni Affairs, Tricia Gomulinski, at tricia@tbp.org.

2016 Alumni Giving Program August-October Contributors

The names of 727 Tau Beta Pi alumni who made donations to the Association in the 2016 Alumni Giving Program appear in two separate sections on the following pages. Their gifts totaling \$110,509 arrived between August 1, 2016, and October 31, 2016. **Gifts received after October 31 do not appear here but will be published in the Spring 2017 issue of The Bent.**

The generous support of each member is deeply appreciated by the Executive Council and other Association Officials. The financial resources have permitted strengthening our programs in several areas that emphasize the importance of Tau Beta Pi's basic objectives and that help all collegiate chapters and student members.

Recognition Club Donors are listed alphabetically within their chapters and appear in the first section below. Member-contributors appear in the last section. Names marked with a † symbol are of deceased members in whose memory donations were made either by relatives and friends or through bequests. In addition to gifts acknowledged here, several were made anonymously through the Combined Federal Campaign and are also deeply appreciated.

Donor Recognition Clubs

The names of 596 Tau Bates appear in this first section. They made donations to the 2016 Alumni Giving Program between August 1, 2016, and October 31, 2016, AND they have also made CUMULATIVE contributions (in some cases including matching gifts) and bequests to Tau Beta Pi through the years totaling from \$250 to more than \$1,000,000.

The Donor Recognition Clubs are part of our effort to recognize a donor's total lifetime cumulative giving to Tau Beta Pi. Such continuous support significantly contributes to the overall strength of the Association and allows our Society, with confidence in our financial resources, to plan for modest growth in our services to the engineering profession. These clubs were chartered by the Executive Council in 1986 and have been set at the following levels:

Matthews Club	500,000	Alpha Club	25,000	Chi Club	1,000
Nagel Club	250,000	Beta Club	10,000	Second Century Club	500
Williams Club	100,000	Delta Club	5,000	Founder's Club	250
Heikes Club	50,000	Zeta Club	2,500		

WILLIAMS CLUB

IA A Anonymous '69
MI Z Lange, Harry W. '75
VA B Anonymous '49

HEIKES CLUB

CA A Mleczo, Gene Leon '47
IN F Anonymous '78
MI G Brems, John Henry '46

ALPHA CLUB
CA E Chow, Hilda Chung-Ching '85
NY E Hollander, Lawrence Jay '51

BETA CLUB

CA A Kepler II, David Edwin '75
CA G Levin, Robert Edmond '53
CA PI Lyons, Eddie Lee '76
GA A Amelio, Gil Frank '65
IL A Holland Jr., Lester Marion '66
LA F Kitchens, Philip Hudgins '67
NY B Frantz, William Theodore '80
NY E Maniscalco, Thomas Louis '67
OH A Robe, Richard '55
OH E Korzep, Stanley '66
PA F Barrow, Bruce Barton '50
RI A Vigar, Judith Wells '83
TX H Trich, John Albert '70
WI A Bolender, John William '51
Anonymous '50

DELTA CLUB

CA F Kovacevich, Richard Marco '65
CA Z Fisher, Dean Lawrence '75
CA N Joy Jr., Robert Lee '66
CT B Hunziker, Robert Neal '83
FL A Anonymous '78
Lewis, Becky Ann '04
MA B Freeman, Reed Frank '61
MI F Anonymous '82
MI E Hock, Roy Edward '51
NJ A Forslund, Donald Charles '60
NJ F Kenney, Thomas Edward '70
NY A Florman, Samuel C. '44
NY A Jacobs, Irwin Frank '56
NY Z Present, Henry '67
NC F Buehler, Martin George '61
OH B Zureick, Elizabeth Ann '75
OH B Abdo, Richard Anthony '65
PA H Hettche, Leroy Raymond '61
Thompson, Robert Alan '60
SC A Root, Suzanne D. '85
WA B Moors, Donald Edward '55
WI A Beutler, Arthur Julius '48

ZETA CLUB

AZ A Carrillo, Danny J. '95
CA B Drowley, Clifford Ian '75
Hammer, David A. '64
CA F Trane, Frank Hood '53
CA N Savage, Homer E. '74
CO A Knight, William James '79
CT B Mastracchio, Robert '64
DE A Kimpel III, Paul H. '70
DC F Ashie, Ibrahim Aborsey '70
IN A Felten, Loren Darrel '57
Hanks, Collis C. '64
IA A Krumbach, Scott David '82
ME A Brigham, Ernest Bennett '53
MD B Trimble, Alan R. '71
MA B Dettmer, Robert Gerhart '55
MA A Birger, Jordan '43
MI Z Dymale, Raymond C. '70
MS A Faries Jr., Charles E. '57
NV A Lovekin, James Warren '80
NH A Dyczewicz, Vickie Sue '96
NJ B Rodgers, Douglas Noss '67
NJ F Kruminis, Aivars Edgars '75
NY B Kelley, David Benjamin '51
Wedlake, Raymond A. '73
NY II Demmel, Hans George '83
NC A Hall, Michael L. '83
OH A Whittington, John Thomas '93
OR A Milton, Stuart W. '84
PA B Marsteller, Charles Edward '74
Moore, Albert Lloyd '56
PA Z Dieter Jr., George Ellwood '50
PA A Honath, Mark E. '80
RI A Healy, Henry Stephen '71
TN B Shackelford III, James R. '60
TX A Bethell, William Decatur '45
TX B Tye III, John M. '67
TX A Strait, William Lewis '49
TX H Nooyi, Raj Kishan '78
TX G Stokes, E. Xavier '72
WV B Ashman, Michael D. '84
WI B Whittington, Laura Lee '88

CHI CLUB
AL A Downs, Brian Joseph '07
AZ A Davis, Robert Allen '79
AR A Weaver, Mark Edwin '77
CA B Young, Lawrence Renwick '71
CA F Hamilton, Willard Ellis '48
Holmen, Bob R. '85
CA E Curry Jr., Winfield Scott '57
Etvuhov, Viktor '56
Yoshizumi, Steven A. '88
CA G Kawahara, Lester Mitsuto '80
CA O Caballero, Ross Charles '72
CA Y Grusep, Nancy T. '88
CO A Anderson, Arvid Neil '54
CO B Clair, David Richard '58
†England, James Stanley '41

Winsand, Amos O. '52
CO A Mehring, James Warren '72
CT B Leib, David Bernard '61
Pressman, Roger S. '69
Tylaska, Theodore Thomas '85
CT F Judd, Kyle Peter '91
DE A Clements, Thomas C. '75
FL B Sipes, Alesia Jones-Parra '84
GA A Akridge, G. Russell '62
Henderson, Richard Dean '53
Sudderth, Stella Mowrey '80
Trawick, Charles David '78
IL A Davison, Brian C. '87
Krupka, John Frank '52
Tataru, Richard Michael '78
Tirpak, Thomas Michael '87
Waranaukas, Amy Louise '85
MI Z Dymale, Raymond C. '70
Ferraro, Anthony Samuel '59
IN A Harper Jr., Clarence Michael '48
Howard, Donovan Richard '58
Pickett, Leroy Kenneth '68
Risa, Kristen '69
Woodsman, Thomas Jay '65
IN B Ruddle, Everett Lindley '64
IN F Richter, Richard Terrell '70
IA A Paris, Stephen Warren '75
Rustwick, John Douglas '71
Stanley, Richard H. '55
IA B Corrao, Debbie G. '93
KS A Johnson, Lee Samuel '77
Massoth, William Henry '82
KY B Trafton, James O. '53
Yee, Ngai Sandy '82
LA B Chaffe III, Black B.H. '55
LA A Blaylock, Martin Edward '61
LA E Champagne Jr., Pierre '76
ME A Gilman, Cynthia Margaret '80
MD A Kutcher Jr., John Francis '86
MD B Sheen, Timothy Walter '72
Tregoning, Robert Lee '87
MA A Horrigan, Lawrence B. '56
MA B Kornafel, Peter Robert '65
Nobel, Sanford Millard '58
Patterson, John Bryan '68
Pershing Jr., John A. '75
Schaffner, Michael J. '63
MA A Buffinton, Keith William '79
Curtis, Jonathan Gregory '69
Flaherty, Joseph C. '84
Green, Samuel Herman '62
MA E Hayden, Thomas Lee '62
Moore, Timothy Eugene '71
Ridlon, Stephen Allan '66
MA Z Koch, Robert Franz '79
MI H Whitley, Norman Lyle '75
MI A Shannon, David Harlow '59
MI B Saul, William Edward '55
MI F Baxter, John Edward '57

Engelhardt, Larry Norbert '77
Goodell, Charles Edward '43
Gray, Jeffrey J. '94
Hansen, Charles '46
Pepper, Julia L. '84
Roof, Richard Rundel '51
MI A Conti, Mark '76
MI Z Ponticello, John Charles '78
McElwen, Stephen N. '54
Volpe, David Randall '74
MI H Lundstrom, Richard Raye '64
MI G Garrity, William Edwards '70
MS A Yates, Karen Wells '73
Yates, Michael Douglas '74
MO A Brownfield, David Lee '68
Currie, Wayne Lee '59
Merz, Jeffrey B. '67
Oehrke, Timothy Chris '75
MO B Feurer, John Alphense '70
MO F Byrne, Clare Theresa '78
NJ F Sharon, Anthony Peter '74
NJ A Yu, Jeffrey Chih-ping '89
NY A Au, Peter Yek Tak '93
NY F Bruch, Charles G. '59
Chamberlin, Donald Melsom '67
Levinson, Stanley H. '78
Pennisi, Joseph Michael '89
Zmrozec, Leon Anthony '78
NY E Boyarsky, David '59
NY Z Tuchband, Stuart Martin '63
NY G Hearl, Steven Charles '80
NY I Neuschaefer, Howard Ernest '65
NY A Kern, Peter Leonard '62
NY II Drexel, Peter George '69
Kaemmerlen III, John T. '76
NY P Abreo, Leslie Anthony '97
NY T Olenik, Anthony Michael '08
NC A Daniels, Eric Andrew '85
Shelton, Monty Lee '84
NC F Jackson, James Roy '69
Rogers, Charles Jack '84
OH A Karkalik, Fred G. '59
Tanaka, Gordon Yoshimi '76
OH B Harner, Brian Lee '85
Zimmerman, Thomas Anthony '65
OH F Jester, Donald John '67
OH A Miller, Truesdell Charles '64
OH Z Allman, Susan Jane '85
Novak, Eugene Clark '59
OH H Beurket Jr., Raymond T. '63
Clarke III, DeFrance '81
Cole, Neil Richard '75
Lantier, Ward John '63
Leifeste, Sam E. '63
OH G Doyle, James Thomas '65
OH J Strausbaugh, Patrick Dennis '86
OH A Eckhardt, Andrew James '79
OK A Blakeburn II, Dave Lowry '83
Gimpel, Robert J. '73

OK B Waldorf, John William '83
OK F Freese, William E. '50
OR A Anderson, Joseph Russell '66
Buxton, Charles Edward '62
PA A Granville Jr., Richard Waldemar '55
Hopkins, Richard Henry '63
Knorr, David Bruce '74
Lentz, Robert Raines '65
PA B Krolick, Ronald David '83
Thompson Jr., Frederick '63
PA A Besarab, Anatole '65
Epstein, Herbert '49
Silvati, Gabriel John '93
PA E Ryan, Richard Edward '86
PA H McDonnell, Robert William '48
Price, Russell William '72
PA G Coyle, Todd Frederick '77
BI B Binnis, George '59
Wadsworth, Gregory Lucian '80
SC A Rushton, Floyd Robert '63
Siokos, George Zachary '48
SC B Husband, D. Mark '83
SC F Gustafson, Richard Alexander '63
TN A Davis Jr., Fred Thomas '47
Ward, Joanne Ross '81
TN B Brown, George Arthur '55
Kepper III, James Henry '71
TN F Steelman, James Taylor '71
TN G Bromenshenkel, Wendy K. '89
McLeod, Jeffrey Keith '83
TX A Hearl, Steven Charles '80
Haskhe, Chester Glen '50
TX B Darby, Leslie '79
Smith, David Lewis '71
TX A Mason Jr., John Michael '81
TX G Van Landingham, David J. '74
TX A Magee, Dan Albert '66
VA A Powell, Joseph Brent '78
VA B Croy, Alvin Quentin '54
Gibbins, Martin Neil '78
WA A Walker, James Rodney '55
WV B Payne, Michael Eugene '81
Stevens, Ellen Weber '84
WI B Hosteny III, Joseph N. '67
Murawski, Steven Lee '80

SECOND CENTURY CLUB
AL A Colberg, Richard Dale '80
AL B Haynes, Charles David '62
AK A Luth, Gregory Paul '74
AZ A Krauss, Leroy E. '50
CA A Ong, Allen '70
Pocha, Michael Donald '68
CA F Austin, Lynn Douglas '61
CA A Fetterolf-Klein, Shelley Marie '82
Shields, Linda '84
CA H Holdstead, Raymond H. '71
Rossow, Terry Lynn '66
CA O Lowe, William Warren '79

SECOND CENTURY CLUB, Cont'd.

CA K Oliver, Carmen D '91
Taylor, Robert Derek '82
CA A Sturgeon, William Randall '70
CA N Lopez, Michael Howard '85
Newberry, Conrad Floyd '57
Sink, John D. '80
CA E Stewart, Diana Frieda '83
CA O Mercado, Frank '79
CA T Komai, Ricardo Kiyohiro '10
CA Y Landis, George Foster '88
CO B Trimbell, Thomas Steven '70
Weber, Douglas C. '70
CO A Barber-Wiltse, Lynda Leigh '79
DE A Tucker, Evelyn May '79
FL A Lorberbaum, Henri Stuart '77
FL B Capeletti, Tami Lee '68
FL Z Delaurentis, Daniel Andrew '92
FL O Burrow, Gregg Dunkin '11
GA A Bodner, Douglas Anthony '87
IL A Allen, Charles Humphrey '66
Baumgartner, Richard Albert '69
Jacobson, Jerome '50
Rosenthal, Mark Alan '81
Schleicher, Kathy Louise '85
IL B Johnson, J. Randall '63
McBlaine, Michael Richard '75
Taylor, Robert Spalding '57
IN A Atterholt, James William '57
Belter, Terry Robert '77
Bower, William Walter '67
Goette, William Edward '56
Heeren, Robert Gene '60
IN G Silio Jr., Charles B. '65
IN A Olson, Stephen Robert '87
IN E Ali, Afzal '78
IA A Cortum, John D. '77
IA B Monk, David Harold '60
KS A Brown Jr., Minter Edward '59
Hinton, Robert Allan '61
Miller, Robert Edward '52
KS B Barkell Jr., James Warren '74
Straka, James Lavern '89
KY B Jodrie, Mary Clare '85
LA A Champagne, Sidney A. '68
ME A Walker, Stanley Edson '62
MD A Hall, H. Thomas '56
Ver Valen, Henry Clay '73
MD B Halvorsen, Fred H. '64
Klein, Marshall Asher '73
Tighe, John Robert '82
Wansley, Brian Woodrow '77
MD G Dickson, Brian Wayne '93
MA A Rotelli, Maryanne L. '88
MA B Hpanper, Robert Wilbur '48
McNeir, Denman Kittredge '48
MA A Savage, Paul David '77
Wolf, Howard Edward '47
MA Z Lynch, David Peter '82
MI A Golden Jr., August '66
MI B Mansfield, Michael Guy '76
Sonsalla, Tim Carl '95
Stamm, John James '61
Barr, William R. '70
MI G Caughey, David Alan '65
Elieff, Richard G. '82
Thomas, David Charles '56
MI E Keller, James Stephen '60
MI Z Gomez, Lloyd E. '55
MI H Webster III, James B. '79
MS A Dixon, Charles J. '56
Hotard, Daniel Gerard '76
MS B Simmons, Mary Ann '85
MO A Zimmerman, Mary Margaret '87
MO B Berkey, Vernon Glessner '50

Brockhaus, Douglas A. '68
Kopsky Jr., Raymond J. '84
Rother, John H. '57
Steinman, Rebecca Lee '96
NH A Major, Alfred Napoleon '50
NH B Cloyd, Joseph R. '02
NJ A Jayco, Jeffrey Allen '77
NJ B Bubenick, David Virgil '73
Keller, Lara Alice '93
Thompson, Peter Daniel '78
NJ G Albanese, Damian E. '52
Gittes, Marvin S. '63
Lipuma, Charles R. '53
Moeller, Peter Allan '78
NJ A Bush, Warren V. '53
NY A Blomberg, Richard D. '67
NY B Gorey, Anthony George '84
Ragonese, Louis John '56
NY G Garland, Newton C. '46
Houle, Michael Enright '74
McKersie, Alan David '52
NY A Elko, Michael Joseph '89
Kneen, Phillip Hall '58
Kuehn, Donald L. '73
Winkle, Roger Allan '67
NY E Kuhn, Alfred '57
NY Z Choma, Peter '73
NY H Del Mazo, Jorge R. '69
Kisilevich, Aleksandr '97
NY O Meyer, Bruce G. '69
NY K Peters, Kenneth Jerome '87
Rie, Henry '53
NY A Killeen, Michael J. '73
Taylor, Alwyn '75
NY M Renzi, Leah Foley '80
NY N Schaub Jr., Thomas Francis '93
Theoclitus, David Thomas '86
NY E Storch, Florian J. '61
NY O Jankowski, Cecelia '81
NY I Fluker, Jon L. '88
NY P Cortina, Thomas J. '87
NC A Davis, John Michael '73
McGirt Jr., Albert F. '64
Neely, Clyde Caldwell '51
Younts III, William E. '79
OH A Cares, William Ronald '63
OH B Cook, Kenneth Foster '74
OH C Zanpani, Michael Alan '87
OH E Diem, Priscilla S. '83
OH Z Busbey, Bruce C. '84
Dembrow, David Alan '82
Spicer, Alvin L. '67
OH H Wolfe, Stephen A. '85
OH O Beck, Charles William '62
Westerheide, Donald Eugene '58
OK A Dotson, Neil A. '84
OK G Krause, Lester Eugene '56
OR A Kondo, Harry Hiroshi '58
PA B Cashdollar, Barron Hamilton '57
McNair Jr., Irving Maxwell '54
PA G Jourdain, John Michael '84
PA A Sern, Stacey D. '86
PA Z Andrichak, Christopher S. '95
Schubel III, Charles William '60
PR A Sanchez, Hector Luis '76
RI A Biddle, Justin Miller '56
Solomon, John Victor '60
RI B Karnes, Jeffrey S. '80
SC G Beckman, Michael Anthony '93
SD A Beck, Carl William '83
Berggren, Mark Harry '76
TN A Exum, Joe Hardman '52
Meriwether, George H. '74
Oliver, Edward Earl '66

Sharp, Jason Wayne '02
Zimmerman, James L. '58
TN B Macchio, Gregory John '84
TN E Cliner, Charles Edward '82
TX A Anderson, John Eldon '57
Eck, Leroy '45
Matlock, John Hudson '67
Evans III, Peter '80
Osborne, David Charles '61
Schacht, John Paul '63
TX G David, Anne Marie '87
Lucas, Raymond David '60
TX A Cox, Ralph Frank '54
Dyson, Norman Kenneth '60
Gerlich, Leon Horace '54
Murthy, Prahlad N. '92
Scott Jr., Charles M. '53
TX Z Mars Jr., James Floyd '72
TX H Godwin, Albert Eugene '84
Hall, Gary D. '84
TX A Odum, Randall A. '57
UT A Olson, Kent Gustaf '65
UT B Hardy, Mark Douglas '84
VT B Clark, David Thomas '81
VA A Colonna, James Lewis '65
VA B Lechner, Richard Albert '59
Roberson, C. Leslie '60
VA G Carlson, Diana Lu Weaver '91
WA A Miller, Steven Claude '72
Perrault, William Richard '59
WV A Bibbee, Dennis Evans '75
Farnsworth, David L. '68
WV B Farmer, Harry Clayton '70
WI A Niemeyer, John Allen '68
WI B Graef, Luther William '52
WV A Jaye, Deborah Ann '83
Oehler, Daniel Arthur '79
Wolf, Thomas F. '59

FOUNDERS CLUB


AL A Reilly, Patrick Francis '93
AL B Ramsey, James David '64
AZ A Hartwein, Kenneth Joe '53
AR A Dockery, David Eugene '76
CA A Spilman, Larry Dalton '69
CA E Ezekiel, Alan Wayne '89
CA A Scottline, Charles A. '61
CA H Daniels, Rami '91
CA I Hovland, Larry Elies '72
CA A Cousins, Michael D. '66
CA N Wanke Jr., Howard John '71
CA P Sullivan, C. Bart '86
CO B Chapra, Cynthia Kiessig '90
FL B Hernandez, Albert Alexander '86
Ross, Martin Cavanagh '76
FL F Miller, Joseph Raymond '73
GA A Jaklitsch, James Joseph '80
IL A Ford, Roger John '75
Ritt, Jack Arthur '52
IL B Ziomek, Arkadiusz '10
IL F Williams, Molly Wells '63
IL A McLachlan, Christopher Robert '96
IN A Hughes, Gordon M. '81
IN A Morris Jr., Thomas Arthur '51
Vanderbilt, Vern Corwin '42
IN G Armstrong, Ashley A. '15
Bongiovio, Robert Paul '69
Markel, Michael Lawrence '78
IA A Johnson, Howard Paul '49
KS B Peterson, Mark Alan '75
KY B Leep, Herman R. '63
LA F Groh-Hammond, Marcia M. '81
Hammons, Robert William '78
Allen, Owen Franklin '54

The IRA Charitable Rollover provision is an easy, tax-wise way to make a gift to TBP!

Donors aged 70½ or older may move up to \$100,000 annually from their IRAs directly to qualified charities without having to pay income taxes on it. The charitable gift amount will count against the donor's required minimum distribution (RMD).

Because the gift would be excluded from income, it may not be included as a charitable deduction on a federal tax return.

IRA custodians may send your gift to Tau Beta Pi Association, P.O. Box 2697, Knoxville, TN 37901-2697. Our federal tax ID number is 62-0479545. If you have any questions, please visit our website at <http://www.tbp.org/give/IRARollover.cfm> or call our office at 865-546-4578 and ask for Pat McDaniel or send an email to pat@tbp.org.



Baron, Robert E. '73
Wye, Roger Edwin '51
MA Z Steenstra, Curtis William '88
Wylie, Bruce K. '66
MI A Beal, Timothy Allen '84
MI B Chekan, Vicki A. '90
Lindgren, Douglas LeRoy '69
MI G Mohsberg III, Sidney Augustus '71
Schmueser, David William '80
MN A Sanders, Ivar '68
MS A Cinnella, Pasquale '87
MO A Lange, Stephen Joseph '85
MT A Kujawa, Stephan T. '73
NJ A Lachance, Peter Andre '81
NJ B Ets, Agu R. '68
NY I Smith, Charles Alan '81
NY A Yen, Hsi-Chen H. '82
NY E Hauptman, Marvin Howard '59
Jesaitis, Algirdas J. '67
NY H Sugin, Leonard '55
NY K Bauer, Bruce Lake '64
Muller-Girard Jr., Otto '89
NY N Greenzweig, Daniel Gregory '82
NY E Miley, Kevin J. '78
NC A Dempsey, Gary L. '82
Nixon, Robert David '82
ND A Kitzcock, Mark Joseph '85
ND B Webster, Adam Lee '02
OH A Meissner, Robert Paul '53
Seegel, Beryl S. '48
OH G Powell, David Allen '71
OH Z Badik Jr., Thomas B. '85
OH H Chi, Maxwell Michael '91
Spector, Marvin '73

Thompson, George William '68
OK A Andrews, Jennifer Diana '96
PA A Matukonis, Edward Stanley '73
PA B Harper, Kenneth L. '74
Kempf, Dwight Clayton '81
PA G Miley II, George H. '55
PA E Cross, David Wilson '67
PA Z Herzog, John R. '57
Kuntz, Jason Paul '95
O'Rourke, John Francis '73
PA H Russell, J. Frank '74
PA B Dombhoff, Edward Scott '91
SC B Kujawa, Stephan T. '73
Veldman, Stephen Todd '98
SD A Karjalainen, Brett Lee '89
TN A Lambert, William Mark '91
Rochat, Vernon Everett '58
TN G Choat, Tracy '83
McCormick, Jack Randall '64
TX A Bouchier, Joe Tom '67
Shields, David Ray '00
TX B Figueroa, Francisco Armando '67
TX A Bernherl, Jeffrey Todd '94
Thomas, Daniel P. '02
UT G Harshbarger, Roger K. '82
Olsen, Kettie Lynn '97
VA A Fountain, Frank S. '52
VA B Blanton, John C. '76
WA B Nelson, Bruce Edwin '54
WA A Nesbitt, John David '82
WI B Wellstein, Frank A. '55
WY A Caudill, Lisa Ann '86

In Grateful Appreciation of Member-Contributors

AL A Whelby, Lynn McClure '15
Wheeler, Kenneth Lamar '56
AL A Couey, William Danny '85
AZ B Ponce, Theresa P. '84
AR A Bowen, James Reece '53
CA A Florez, Valerie Province '99
CA G Fink, Allison Michelle '13
CA D Froemelt, Lydia Robin '12
CA E Heirigs, Philip Lawrence '84
Wang, Simon '13
CA O Florez, Paul Mark '06
CA I Schamp, Carol J. '74
CA K Ramin, Kyle Patrick '13
CA E Armbrust, Virginia L. '83
Fox III, Lionel Phillips '15
Reinhart, Andrew Michael '13
CA Y Nielsen, Karl Stuart '14
Tran, Phoebe '12
CA X Withers, Heather Nicole '12
CA AF Fernandez, Matthew Go '07
CO A Drennon, Clarence Bartow '58
CO B Brown, Charles D. '56
Womack, Gregory Paul '77
CT F Allen, Elizabeth Anne '01
Friedman, Cary Alan '84
Roberts, Scott J. '74
Chuku, Adanne N. '99
DC A Abellada, Jason Alinea '04
Brown, Shannon Bentley '14
FL A Paugh, Wayne Bruce '93
Schnitzler, Paul '57
FL E Sookhoo, Allan Rajesh '12

FL H Lusk, Kyle Dorian '13
Redmon, Carissa G. '14
FL O Tufan, Bunyaminy '13
FL I Tan, Peter Koon Lai '13
GA A Gresham, Joshua James '10
Gurley, Thomas Brook '59
GA B Morgan, Scott Robert '96
IL A Turkowski, Kenneth E. '74
IL B Sahlstrom, Roy '45
IN A Ichikawa, Ralph M. '57
Trickle, Chris Michael '13
IN G Roth, Dawn Renee '85
IN A Berndt II, Robert John '83
IA A Li, Jim '14
Schebler, Michael John '69
KS A Horner, J. Michael '70
Qian, Cheng '16
KY A Mitchell, Joseph Blanc '74
LA B Seals, Keith James '79
ME A Saltzman, Robert Samuel '50
MD B Freedman, Earle Sherman '50
MA A Burns, Colin McKinley '15
MA B Schmidt, Robert Max '58
MA O Oseni, Salewa T. '96
MI B Kicinski, Stephen E. '59
Sauer, Daniel Michael '05
MI G Chen, Alfred '14
DePaul, James Salvatore '13
Lee, Taehwa '14
Sproull, William Cargill '55
MI A Sommerfeld, Jude Thomas '58
MS A Hatcher, Warren Andrew '72

Morton Jr., Daniel C. '47
MO A Goolsby, Jerry Dale '91
MT A Hart, William Frank '67
MT B Adams, Tammi Marie '89
NE A Morse, Jonathan Lee '03
NV B Lee, Christopher S. '13
NJ A Chiarello, David Matthew '66
NJ B Connolly, Catherine '15
Covell, Daniela Maria Ana '90
NJ F Beshay, Joseph A. '09
De Rossi, Vincent John '90
Thompson, Peter A. '66
NY A Carlucci Jr., Joseph J. '68
NY O Dangler, Paul Edward '76
Jerabeck, Valerie Barlow '76
NY I Plante, Donnarray '03
NY K Weinstein, Michael Robert '85
NY A Reilly, Jane E. '82
NY I Rukas, Christopher James '12
NY T Wu, Ryan '15
Zheng, Walter '12
NY Y Crowley, John Patrick '14
NC F Ballard, William E. '52
OH B Salkali, J. '93
OH G Strang, David Arthur '51
OH E Amtsberg, Donald Gordon '51
Handschuh, Robert Frederick '82
OH H Davis, H. Max '53
Harding, Bruce Gene '85
Sallberg, Scott Anthony '03
OH O Glasgow, Brock Philip '10

OH I May, Ariane Petersen '05
Snyder, Sharon E. '09
PA A Esser, Jefferson Randolph Cary '48
Godshall, H. Lynn '62
PA B McNally, Dianne Jean '85
PA G Fisher, Arthur Douglas '74
PA Z Spady, Richard John '51
PA O Chelius, Timothy G. '83
SC A Bush, Jessica Robin '13
Klein, Krysta K. '13
SC F Hass, Paul Henry '56
TN A Lambert, Lisa Vaughn '90
Wintenberg, Alan Lee '81
TN B Pitney, Alan Roger '88
TN F Griggs, Philip Tucker '14

TX A Farley, Ramsey Wayne '61
TX F Ochoa Jr., Alfredo Anthony '76
TX H Kadavara, Naveen '09
UT B Koffard, Kevin Rex '15
Reeder, Michael George '14
VT A Morrissey, Timothy Joseph '76
WA A Reavis, Gretchen Marie '84
WA B Slaughter, John B. '56
Wilbur, Joel Edwin '98
WA A Bartenhagen, Christopher J. '13
WV A Blair, John Denver '83
WI B Schaefer, Donald B. '63
WI A Gigliotti, Nika Maria '14
WI E Bullock, John Walter '97

\$o Ea\$y to Give \$tocks or Fund\$

Giving to Tau Beta Pi has become easier for those with Fidelity, Vanguard, and T. Rowe Price non IRA or 401k accounts.

We have established accounts with the above companies to facilitate the transfer of appreciated stocks or mutual funds directly from a donor's account.

Your tax deductible gift will equal the day's price of the stocks or fund shares and you realize no appreciated capital gains on the gift and incur no administrative costs.

What could be easier? Thank you to Arno W. Brill, TX A '71, and Gerald E. Myers, AZ B '70, who suggested the idea and have recently made gifts to Tau Beta Pi through this method.

For more information, contact Pat McDaniel at pat@tbp.org or call 865-546-4578.

Special Gifts

A special gift was made in memory of Jack M. Meena, WY A '91, a former District 12 Director, from Curt and Tricia Gomulinski, MI E '01 & SD A '98, respectively. Jeannette Bowen made a gift in memory of her husband, James R. Bowen, AR A '53. Nancy Zeigler-Lyons made a special gift in memory of her husband, Eddie Lyons, CA P '76.



IN THE COLLEGES

SPOTLIGHT

'Redshirt' Program Expands

A program to help more low-income and minority students major in engineering has been so successful that the National Science Foundation is expanding it.

The federal agency has awarded \$5 million to six universities to expand or create "academic redshirt" programs. These programs enroll promising engineering students from low-income households—many of them women and minorities—and give them an extra year of math and science courses before they enter the engineering major.

Redshirting is an idea taken from college athletics, in which student-athletes get an extra year to mature.

The award will make scholarship money available to 800 students studying engineering at six schools, including three that already have the program—University of Washington, Washington State University, and University of Colorado, Boulder—and three new schools: Boise State University, University of California, San Diego; and University of Illinois, Urbana-Champaign.

Still More Degrees

U.S. students graduating with bachelors' degrees in engineering grew by nearly 8% in 2015, says an American Society for Engineering Education report. This represents an upward trend which began in 2007.

The largest increases of bachelor degrees were in computer-related engineering programs: computer engineering, 16.2%; computer science (inside engineering), 17.6%; and engineering management, 21.3%.

Full-time enrollment in undergraduate engineering programs also increased by 7.4%. Master's degrees awarded increased by 11.1% in 2015 while enrollment in master's programs increased by 6.7%. Doctoral degrees awarded increased by 3.4%.

STEM Warning

Raytheon Vice President of Corporate Affairs and Communications Pam Wickham said recently that the U.S. was falling behind when it comes to inspiring and preparing teenagers to take on careers in STEM.

In an op-ed for *U.S. News & World Report*, she noted that recent data indicates high school students "have less interest in the important fundamental subjects of math and science," and "a quarter of our 15-year-old students don't even reach the baseline of math proficiency."

To remedy this, Wickham contends, "businesses and philanthropic organizations can step in and provide students and teachers with supplemental programs," which can help educators to be more effective, and help "feed tomorrow's hungry STEM talent pipeline."

Virtual Reality

Professors at engineering schools across the world are increasingly using virtual reality in the classroom reports *U.S. News & World Report*.

Students and professors can "visit one another in a virtual space if they can't meet in person," and schools "are also exploring medical applications of virtual reality that could save lives, such as 3-D X-rays that allow doctors to peer inside the bodies of patients."

The *U.S. News* article lists three advantages of attending engineering schools with robust integration of VR, including clear 3-D diagrams and visualizations, the ability to "envision new applications" for the VR technology itself, and the career benefits of graduates being able to market themselves to firms which are using virtual reality.

Engineering Jihad!

Researchers have noticed that an oddly large number of jihadists have engineering backgrounds, reports

The Chronicle of Higher Education.

Social scientists Diego Gambetta and Steffen Hertog, recently "scrutinized the numbers and concluded that, yes, the proportion of terrorists who are engineers far outpaces expectations. Why is that? ... Central to the debates are questions of causality: Do engineering programs select a certain kind of person, one who arrives on campus already predisposed toward acts of terror?"

"Does something in these programs worsen some students' tendency toward extremism? Or is the relationship between terrorism and engineering simply an intriguing correlation with no deeper meaning?"

PEOPLE

Mun Y. Choi, Ph.D., Illinois Alpha '87, is the new president of the



University of Missouri's four-campus system. The selection of the former provost of the University of Connecticut came a year after the resignation of the system's pre-

vious president amid protests over racial issues at its Columbia campus. Choi was engineering dean at UConn prior to becoming provost in 2012 and had been associate dean of research at Drexel University.

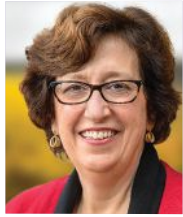
Jerome A. "Jerry" Gilbert, Ph.D., Mississippi Alpha '77, has become



the 37th president of Marshall University. A Mississippi native with a background in biomedical engineering, he was previously provost and executive vice

president at Mississippi State University, his alma mater.

Martha E. Pollack, Ph.D., Michigan Gamma '79, has been elected as



president of Cornell University. She is provost and executive vice president for academic affairs at the University of Michigan and will take office

April 17. Pollack was appointed to her present position in 2013 and has been on the Michigan faculty since 2000. Prior to becoming provost, she was vice provost for academic and budgetary affairs, dean of the school of information, and associate chair for computer science and engineering in the department of electrical engineering and computer science.

Eric F. Spina, Ph.D., Pennsylvania Gamma '83, has been named as president of the University of Dayton and the second lay leader in its 165-year history. He previously spent 27 years at Syracuse University, including nine as vice



chancellor and provost. A researcher and author with a 20-year focus on experimental high-speed fluid mechanics, he has worked on multi-million dollar grants from NASA, the National Science Foundation and the Environmental Protection Agency.

Lakshmi N. Reddi, Ph.D., Kansas Gamma '82, has been selected as



the dean of New Mexico State University college of engineering. He had been dean of Florida International University's graduate school and professor in

the department of civil and environmental engineering since 2011. Prior posts included teaching at the University of Central Florida, Kansas State University, and Stevens Institute of Technology.

FACILITIES

Clemson University is being provided with a \$357 million software grant by Siemens USA for the school's engineering programs. Siemens is giving its so-called Product Lifecycle Management platform, which is used by BMW, Boeing, and more than 140,000 manufacturing customers worldwide to manage product development, inventory, and other operations.

Clemson President Jim Clements said the new partnership will make the university's students "even more attractive to future employers—especially many of the world-class, advanced manufacturing companies operating in South Carolina."

Johns Hopkins University's school of engineering is receiving \$15 million from the Clark Charitable Foundation to provide financial aid and create a new academic program for undergraduate engineering students. This gift is the biggest the school has ever received.

The gift honors the late **A. James**



Clark, Maryland Beta '50, a former trustee of the university and of Johns Hopkins Medicine, and a construction engineer and executive for more than 60

years. The university said it will establish the Clark Scholars Program and bolster the school's ability to attract talented engineering students while providing need-based aid.

Marquette University's college of engineering has received a \$3.5 million gift for scholarship aid from Frances and **Donald J. Herdrich, Wisconsin Beta '69**. The endowment will fund full scholarships for first-generation students.

The Herdrichs were first-generation college students, as were 23% of Marquette's most recent incoming class. Donald served in Vietnam as a U.S. Army helicopter pilot before

going into investment management. He became a founding partner of Stonebridge Partners, a private equity firm that focuses on middle-market manufacturing businesses.

Montana State University's new college of engineering is under construction after a prototype of a lunar mining robot built by MSU students for a NASA competition helped to break the ground.

The robot, made by engineering and computer science students, dug up symbolic scoops of sand and dignitaries used ceremonial shovels for the dedication.

The college is being funded by a \$50 million gift from MSU alumnus Norm Asbjornson, who founded AAON Inc., a heating, ventilation and air conditioning manufacturer based in Tulsa, OK. Construction is expected to be completed in 2018.

University of Texas is receiving a \$3.9 million grant to study problems within the storm drainage system and the impacts it could have on water quality.

The school of engineering will create a center where they can use water infrastructure models to locate flooding problems in drains, as well as handle water quality issues.

University of Washington is receiving a \$10 million donation from Amazon to help the school build a 130,000-square-foot building that will double its computer science and engineering program's capacity.

According to UW President Ana Mari Cauce, the program turns away interested students because of limited room. UW is working to raise \$110 million for the project, which is expected to be completed in 2019.

In a statement, Amazon CEO **Jefrey P. Bezos, New Jersey Delta '86**, said: "We are lucky to have thousands of UW graduates inventing and pioneering in Seattle—including right here at Amazon."





Brain Ticklers

RESULTS FROM SUMMER

Perfect

*Couillard, J. Gregory	IL	A	'89
*Gee, Albert	CA	A	'79
Gee, Nora W.	CA	A	'79
Gee, Aaron J.	CA	Ψ	'16
*Gerken, Gary M.	CA	H	'11
*Norris, Thomas G.	OK	A	'56
Oliver, Christopher R.	AL	E	'08
*Prince, Lawrence R.	CT	B	'91
Richards, John R.	NJ	B	'76
Seidel, Mark N.	MA	B	'83
Slegel, Timothy J.	PA	A	'80
*Widmer, Mark T.	OH	A	'84

Other

Aron, Gert	IA	B	'58
Ashurst, Bob R.	AL	A	'98
Beaudet, Paul R.	Member's father		
Bernacki, Stephen E.	MA	A	'70
*Bohdan, Timothy E.	IN	Γ	'85
Demsky, Howard J.	MO	Γ	'88
*Griggs Jr., James L.	OH	A	'56
*Gulian, Franklin J.	DE	A	'83
Gulian, William F.	Member's son		
Hays, G. Murray	GA	A	'79
Hufstedler, Andrea K.	OH	B	'97
Johnson, Roger W.	MN	A	'79
Jones, Donlan F.	CA	Z	'52
Jones, John F.	WI	A	'59
Jones, Jeffrey C.	Member's son		
Jordan, R. Jeffrey	OK	Γ	'00
Kimsey, David B.	AL	A	'71
Lalinsky, Mark A.	MI	Γ	'77
Munsil, Wesley E.	CA	B	'71
Parks, Christopher J.	NY	Γ	'82
*Pinkerton, Audrey D.	TX	A	'90
Pinkerton, Kate	Member's daughter		
Rentz, Peter E.	IN	A	'55
Rentz, Mark	Member's son		
Riedesel, Jeremy M.	OH	B	'96
*Schmidt, V. Hugo	WA	B	'51
Schweitzer, Robert W.	NY	Z	'52
Sigillito, Vincent G.	MD	B	'58
*Spong, Robert N.	UT	A	'58
Strong, Michael D.	PA	A	'84
Summerfield, Steven L.	MO	Γ	'85
Voellinger, Edward J.	Non-member		

*Denotes correct bonus solution

SUMMER REVIEW

The most challenging problem by far was No. 5, about determining certain digits of a constructed sequence of numbers. Fewer than half of submissions contained a fully correct set of the 13 requested digits. Contrastingly, No. 3, which required the formation of a 27 digit sequence, was easier than anticipated by the judges. A few readers pointed out that the problem actually had 186,624 solutions. Everyone who

submitted an answer found at least one of the valid solutions. We also acknowledge **Wesley E. Munsil, CA B '71**, who gave the exact (9991 decimal place) answer to No. 2.

FALL ANSWERS

1 ONE/FIVE = .TWO translates to $495 / 1875 = .264$. For simplicity, the problem can be restated as $FIVE * TWO = ONE,000$. O and F cannot be 0. Observe that $O > T * F$. TWO is even, so O must be 2, 4, 6, or 8. For the product ONE,000 to end in 0, either E is 5, or E is 0. Assume E is 0. The product ONE,000 must be a multiple of 10,000, and therefore its prime factorization must contain at least 4 2's and 4 5's. None of the 5's can be a factor of TWO (it is even and doesn't end in 0, after all) and exactly one of the 2's is a factor of FIVE (else FIVE ends in more than one zero). That is, FIVE is an odd multiple of 1250 and TWO is a multiple of 8. There are only three four-digit multiples of 1250 that have four distinct values, and that can meet $O > T * F$: FIVE is one of 1250, 3750, 6250. Now, consider TWO, a three digit number (potentially containing a leading zero) that is a multiple of 8, with no repeated digits, such that $T * F < O$. There are fewer than a dozen TWOs that suffice and have no conflicting digits, but none meet the $TWO * FIVE = ONE,000$ criteria. So E is not 0; we conclude $E=5$.

Using logic similar to above, if E is 5, then the product ONE,000 must be an odd multiple of 5000, and the prime factorization must contain at least 3 2's and 4 5's. None of the 5's can be a factor of TWO and none of the 2's can be a factor of FIVE. That is, FIVE is an odd multiple of 625 and TWO is a multiple of 8. There are only three four-digit multiples of 625 that end in 5, have four distinct digits, and can meet the $T * F$ criteria: FIVE is one of 1875, 3125, and 4375. Again, TWO must be a (odd this time) multiple of 8, with no repeated digits, meeting $T * F < O$. In the solution, $TWO = 33 \times 8 =$

264 matches with $FIVE = 1875$ and $ONE = 1875 \times 8 \times 33 / 1000 = 495$.

2 The cash discount would be **\$556.55**. One approach to the problem is to make use of a spreadsheet with the following definitions:

$a[n] = 1 + a[n-1]$	= month
$b[n] = b[n-1] - d[n]$	= loan balance
$c[n] = b[n-1] * .06/12$	= interest payment
$d[n] = 10000/36$	= principal payment
$e[n] = c[n] + d[n]$	= monthly payment
$f[n] = (1 + .10/12)^n$	= discount factor
$g[n] = e[n]/f[n]$	= Discounted Cash Flow

	A	B	C	D	E	F	G
Month	Loan	Int.	Princ.	Payment	Factor	DCF	
0	10000.00	6.0%	2000.00	2000.00	10.0%	2000.00	
1	9722.22	50.00	277.78	327.78	1.0083	325.07	
2	9444.44	48.61	277.78	326.39	1.0167	321.02	
3	9166.66	47.22	277.78	325.00	1.0252	317.01	
4	8888.88	45.83	277.78	323.61	1.0338	313.04	
5	8611.10	44.44	277.78	322.22	1.0424	309.12	
6	8333.32	43.06	277.78	320.84	1.0511	305.26	
7	8055.54	41.67	277.78	319.45	1.0598	301.42	
8	7777.76	40.28	277.78	318.06	1.0686	297.63	
9	7499.98	38.89	277.78	316.67	1.0775	293.88	
10	7222.20	37.50	277.78	315.28	1.0865	290.17	
11	6944.42	36.11	277.78	313.89	1.0956	286.50	
12	6666.64	34.72	277.78	312.50	1.1047	282.88	
13	6388.86	33.33	277.78	311.11	1.1139	279.29	
14	6111.08	31.94	277.78	309.72	1.1232	275.75	
15	5833.30	30.56	277.78	308.34	1.1326	272.25	
16	5555.52	29.17	277.78	306.95	1.1420	268.78	
17	5277.74	27.78	277.78	305.56	1.1515	265.35	
18	4999.96	26.39	277.78	304.17	1.1611	261.96	
19	4722.18	25.00	277.78	302.78	1.1708	258.61	
20	4444.40	23.61	277.78	301.39	1.1805	255.30	
21	4166.62	22.22	277.78	300.00	1.1904	252.02	
22	3888.84	20.83	277.78	298.61	1.2003	248.78	
23	3611.06	19.44	277.78	297.22	1.2103	245.57	
24	3333.28	18.06	277.78	295.84	1.2204	242.41	
25	3055.50	16.67	277.78	294.45	1.2306	239.28	
26	2777.72	15.28	277.78	293.06	1.2408	236.18	
27	2499.94	13.89	277.78	291.67	1.2512	233.12	
28	2222.16	12.50	277.78	290.28	1.2616	230.09	
29	1944.38	11.11	277.78	288.89	1.2721	227.10	
30	1666.60	9.72	277.78	287.50	1.2827	224.14	
31	1388.82	8.33	277.78	286.11	1.2934	221.21	
32	1111.04	6.94	277.78	284.72	1.3042	218.32	
33	833.26	5.56	277.78	283.34	1.3150	215.46	
34	555.48	4.17	277.78	281.95	1.3260	212.63	
35	277.70	2.78	277.78	280.56	1.3370	209.84	
36	0.00	1.39	277.78	279.17	1.3482	207.01	
Totals:		925.00	12000.00	12925.00		11443.45	

The \$12,925 the seller of the car receives over 36 months has a net present value of \$11,443.45. A fair discount is therefore \$12,000 - \$11,443.45 = \$556.55.

3 **Algernon is English, Conservative and Catholic; Basil is English, Conservative and Protestant; Clar-**

ence is Irish, Liberal and Protestant.

For Basil to know anything about Clarence, both Basil and Algernon must be the same in nationality and politics (which means Clarence is the opposite of Basil for those two traits). For Basil to know Clarence's religion, Clarence must be an Irish Liberal which makes Clarence's religion Protestant. It follows that both Basil and Algernon are English and Conservative. For Basil to know Algernon's religion, Basil must be Protestant and Algernon must therefore be the only Catholic.

4 Let N equal the number of copies, with each copy initially having 36 chapters. Each chapter can be missing from at most 2 copies, for otherwise there would be a choice of 3 copies that was not complete. Furthermore, no two copies can have the same 2 missing chapters, for otherwise there would be a violation of the requirement that for any pair of chapters, there is at least one copy missing only one of them. The number of ways of picking two copies is $C(N, 2)$, where $C(i, j)$ is the number of ways of picking i objects, j at a time. In addition, there can be N chapters that are missing from only one copy without violating the above principle. Therefore, we have $C(N, 2) + N = 36$, which has a solution of $N = 8$. The following array shows one possible solution. Since $C(9, 2) = 36$, $N = 9$ also works, but we asked for the smallest N .

```
01111111 1111 1111 1111 1111 1111 1111 1111 0000000
10111111 1111 1111 1111 1111 000000 1111110
11011111 1111 1111 00000 111110 1111101
11101111 1111 0000 1110 11101 1111011
11110111 1111 000 1110 1101 11101 1110111
11111011 100 110 1101 1101 11011 1101111
11111101 010 101 1011 10111 101111 1011111
11111110 001 011 0111 01111 011111 0111111
```

5 $r = 7$. Consider an equilateral triangle of side length 15 whose corners could be truncated (equilateral triangles of side length 2 can be removed) to form the given hexagon. The apothem of this triangle is $15\sqrt{3}/6$. Draw a radius r of the circumscribing circle of the hexagon to one of the vertices, creating a right triangle with sides $15\sqrt{3}/6$, $11/2$, and

a hypotenuse of r . Use the Pythagorean Theorem to find $r^2 = (675/36) + (121/4) = 49$, so $r = 7$.

Bonus $f(N) = (2^{N+1} - 2^{(N+1) \bmod 2})/3$. It is best to initially proceed by inspection and deduce a pattern:

- f(1) = 1: 1 -> 0
- f(2) = 2: 11 -> 01 -> 00
- f(3) = 5: 111 -> 110 -> 010 -> 011 -> 001 -> 000
- f(4) = 10: 1111 -> 1101 -> 1100 -> 0100 -> 0101 -> 0111 -> 0110 -> 0010 -> 0011 -> 0001 -> 0000

Continuing in this fashion, it is also seen that $f(5) = 21$ and $f(6) = 42$.

For N even, $f(N) = 2 * f(N-1)$. For N odd, $f(N) = 2 * f(N-1) + 1$. This can be combined into a single recurrence relation $f(N) = 2 * f(N-1) + (-1)^{N-1/2} + 1/2$. A particular solution to the above equation can be guessed of the form $f(N) = B * (-1)^N + C$, and plugging this into the recurrence relation gives $B * (-1)^N + C = 2B * (-1)^{N-1} + 2C + (-1)^{N-1/2} + 1/2$. Combining and equating like terms gives $B = -1/6$ and $C = -1/2$. A homogeneous solution to the recurrence relation $f(N) = 2 * f(N-1)$ is clearly of the form $A * 2^{N-1}$. The constant A can be found by taking the sum of the particular solution $-1/6 * (-1)^N - 1/2$ and the homogeneous solution $A * 2^{N-1}$, plugging in the initial condition $f(1) = 1$, giving $A = 4/3$. Thus $f(N) = 4/3 * 2^{N-1} - 1/6 * (-1)^N - 1/2$. Note the last two terms equal either $-2/3$ or $-1/3$, depending on whether N is even or odd, respectively. These two terms can be combined into one term by taking advantage of modulo arithmetic; this is equivalent to $-1/3 * 2^{(N+1) \bmod 2}$, and leads directly to the simplified form stated above.

Computer Bonus The next six values of the specified function are:
 f(4) = 246 = 2·3·41
 f(5) = 1230 = 2·3·5·41
 f(6) = 13830 = 2·3·5·461
 f(7) = 60710 = 2·5·13·467
 f(8) = 446010 = 2·3·5·14867
 f(9) = 2992890 = 2·3·5·67·1489

NEW WINTER PROBLEMS

1 Looking for some PUZZLES to fill up your WINTER? What is the solution to the following cryptarithm?

PUZZLE + PUZZLE + PUZZLE + PUZZLE = WINTER. Standard rules apply. Each different letter stands for a different digit, and each different digit is always represented by the same letter; no leading zeros are allowed.

—Jeffrey R. Stribling, Ph.D.
CA A '92

2 Art, Bob, Cai, Dan, and Eli took a test and were ranked (with no ties) according to their performance. They were each informed of their own ranking, but no one was told details of the others' ranks. Art said he wasn't second, and Bob, who had recently claimed himself a psychic, announced confidently he was sure he was two places better than Dan. Cai overheard these remarks and came to the conclusion—for reasons that need not concern us—that one of them was right and the other wrong. After a pause for reflection Cai, who is a Tau Bate and hence highly intelligent, said that he could announce the correct ranking for all five people. But when he did so, he had got everyone in the wrong place except the bottom two. What is the correct order? (It is somewhat satisfying that Art and Bob are placed in the order of their truthfulness.)

—101 Brain Puzzlers, E.R. Emmet

3 Find a scalene triangle with integral sides and no right angle, such that at least one of its angles is an integral number of degrees. What are the lengths of the sides of such a triangle with the smallest perimeter?

—Adapted from *Technology Review*

4 The end of my sink faucet bends at a right angle to the horizontal so that the opening, which has an inside diameter of 2.0 cm, points vertically down. The water system has a pressure regulator that, with the faucet fully open, produces a steady downward stream with a circular cross section at a rate of 8.328 L/min. I noticed that the stream tapers down to a diameter of 0.9 cm at the point at which it reaches the drain. To the nearest millimeter, how far is the drain from the faucet opening? Use

a value of 9.807 m/s^2 for the standard acceleration due to gravity.

—Adapted from *The Chicken from Minsk* by Yuri Chernyak and Robert Rose

5 Allen and Bill were nominated for president of the Golf Club. The club has 350 members, not all of whom voted. The tellers removed the votes from the ballot box and counted them one at a time. Allen not only won, but he was ahead of Bill throughout the entire count. If the probability of this occurring was exactly one in 100, how many votes did Allen and Bill each receive?

—*New Scientist*: Colin Singleton

Bonus Consider a triangular number T which is simultaneously the sum of two cubes and the difference of two cubes (e.g., $T = A^3 + B^3 = C^3 - D^3 = n(n+1)/2$) such that $D = B + 1$.

The first such number is $91 = 3^3 + 4^3 = 6^3 - 5^3$, and the second is 48427561 = $360^3 + 121^3 = 369^3 - 122^3$. What is the general formula for the i^{th} such number?

—*Elementary Number Theory*,
David M. Burton

Computer Bonus The prime-counting function, usually denoted as $\pi(x)$, returns the number of primes less than or equal to a positive integer x . Similarly, the semi-prime-counting function, usually denoted as $\pi_2(x)$, returns the corresponding number of semi-primes (integers with exactly two prime factors, not necessarily distinct). For example, $\pi(20)=8$ and $\pi_2(20)=6$. What is the minimum value of x such that $\pi_2(x)/\pi(x) > \pi$ (the mathematical constant 3.1415....)?

—**Jeffrey R. Stribling**, Ph.D.,
CA A '92

Postal mail your answers to any or all of the Brain Ticklers to Curt Gomulinski, Tau Beta Pi, P. O. Box 2697, Knoxville, TN 37901-2697 or email to BrainTicklers@tbp.org as plain text only. The cutoff date for entries to the Winter column is the appearance of the Spring *Bent* in early April (the digital distribution is several days earlier). The method of solution is not necessary. We welcome any interesting problems that might be suitable for the column. The Computer Bonus is not graded. Curt will forward your entries to the judges who are **H. G. McIlvried III**, PA Γ '53; **F. J. Tydeman**, CA Δ '73; **J. C. Rasbold**, OH A '83; and the columnist for this issue,

J. R. Stribling, CA A '92.

LETTERS TO THE EDITOR

(Continued from page 9)

and were divided into groups of three. Each group was given sealed instructions and informed that we were to open and follow them and to provide a report by the following morning. Our team's instructions started with observing the Red Cedar River. Fortunately, I had a car so we pushed it until it started and took off on our assignment.

With complicated instructions involving the quantity of water flowing and the heat loss through the windows of the bars in East Lansing, etc. etc., we settled in an apartment and provided the requested information by morning.

A few days later we were invited to attend a dinner with our wives or girlfriends, during which we were given back our unopened reports and informed that we were now officially members of TBPI!

Fun Times!

John D. L'Hote, MI A '49

Cartoon Protest

• I unintentionally opened the Spring 2016 *Bent* to the last page first. I was upset when I read the PC Weenies cartoon belittling ethics

as “boring” and “fiction.” This is an affront to the many engineers that I've worked with who work hard at conducting their business ethically and encouraging others to do the same. It is a serious disservice to the profession to encourage members who may consider ethics as abstract or idealistic and therefore discredit the profession as a whole.

John R. Smith, P.E., TX A '71

[*Artist response: My intent in the referenced comic was not to belittle ethics, but rather draw attention to the fact that ethical standards have decreased across many companies.*]

“Pseudo-Profession” Fear

• I believe you, your team, and Dr. Gray are doing great work. Based on President Blackford's Council's Corner (Spring 2016 *Bent*), I guess I am not the only person that has gained an alarming amount of appreciation of Tau Beta Pi and *The Bent* as my career—and age—has progressed.

As J.P. wrote, “The first time I heard about Tau Beta Pi ... I received my letter to join.” I didn't even know why I should join but I did—thankfully. Now, after mul-

iple decades, I've become convinced that Tau Beta Pi may be the number one catalyst to stimulate and transform engineering from a “pseudo-profession” to a fully honored, respected, and trusted profession.

I could write pages of testimony why I begrudgingly use the term “pseudo-profession” but that will come at a later time as I witness an increasing rate of poor performances blamed on “engineering” where degreed and/or Professional Engineers were NOT involved—the Flint, MI, water crisis, the General Motors ignition switch scandal, etc.

We really need to ELEVATE the profession into the fabric of our “public”—I guess through government ... but hopefully without politics. Is that possible?

Randy E. Smith, PA B '84



The SIRVA Home Benefits discount program, powered by SIRVA Relocation, provides you, your friends, and family access to cash-back rewards and discounts on real estate, mortgages, and moving services that could save you more than \$2,000 or more on moving costs! call the SIRVA Home Benefits team at 866-756-5947.

PRESIDENT'S REPORT

(Continued from page 16)

become an Association Official. I have heard too many people tell me that they were a member back in college. *You are always a Tau Bate!* Remember to stay connected and consider supporting us, even with something as simple as displaying your membership certificate or Bent in your office and letting others know that you are proud of your membership. At our Virginia Delta Chapter at the Virginia Military Institute, the cadets have a tradition of rubbing the Bent monument for good luck. In that tradition, I hope that your membership will bring you success in your career.

I am reminded of the first and last lines of the poem "Dream Big" that is included in the *President's Book*, and was in an advertisement for a Macintosh computer my freshman year in college: "If there were ever a time to dare, to make a difference, to embark on something worth doing, it is now..." I hope that you consider that now is the right time to do something that makes a difference for Tau Beta Pi. The last line, "...you will pass this way only once...do it right!" sums up for me the Convention experience. Many of you will attend Convention only one time—I hope it inspires you to "dream big" and to "do something that makes a difference" for Tau Beta Pi, the engineering profession, and the world.

Thank you for the honor and privilege of leading Tau Beta Pi. Let's "do it right" here at Convention, have fun, "dream big," and together make extraordinary contributions to create a better Association and world!

2014-16 PRESIDENT

Joseph P. "J.P." Blackford, District of Columbia Gamma '95, is a graduate of George Washington University with



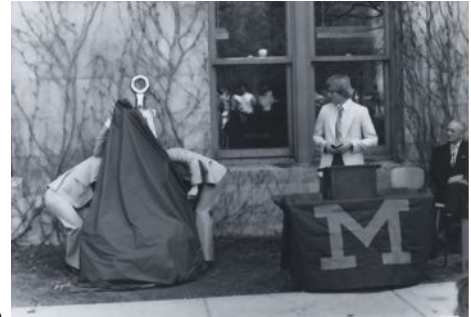
has served as an Engineering Futures Facilitator since 2003 and was a District 4 Director from 2005-14.

a B.S. in civil engineering *summa cum laude* and an M.S. in environmental engineering. He is an adjunct faculty member in the engineering management and systems engineering (EMSE) department at George Washington University and previously served as director of doctoral programs for the EMSE off-campus programs office at GW. Blackford

TELL US THE TALE... WIN A T-SHIRT!

SEND US your best captions for this snapshot from Tau Beta Pi's photo archives, and if it is judged one of the best, you will win a TBP t-shirt of your choice!

The picture taken April 19, 1980, captured Michigan Gamma's dedication of its new Bent monument in honor of Prof. A.D. Moore, PA Γ 1915, shown seated on the right.



Chapter officers attending to the new Bent are

Michael T. Koinis, MI Γ '80, and Howard K. Fertel, Ph.D., MI Γ '79. Michigan Gamma President Bradley G. Titus, MI Γ '80, presided over the affair.

Submit your entries to pat@tbp.org, or mail them to HQ by January 30, 2017.

The photo for the Fall Contest, below, which appeared in the Winter 1987 issue, was taken on Halloween during the 1986 Convention in College Park, Maryland. The caption read: "The great 'pumpking' and Secretary Jim Froula at Convention."

The judges carefully considered 32 captions submitted by 13 readers. It was a dead heat until the very end when Dante A. Masnada, CA Z '75, was declared the winner for this caption: "I've been feeling a bit light headed lately..."

The second place entry was submitted by Jonathan C. Silver, CT Γ '08: "Moments before Jim Froula was turned into Betelgeuse."

There was a three-way tie for honorable mention: "Damn it Ichabod! This replacement does NOT meet original design specs."

and "Oh crap! Enrico, this was not mentioned on your list of possible side effects." both conjured up by George W. Sine Jr., GA A '68. From Brian R. Tilles, P.E., FL E '93, we have: "Oh my...does this jacket make my head look small?"



\$\$ Benefit for Members

Members may be eligible for an additional discount off their automobile insurance.



Did you know that GEICO provides a discount to Tau Beta Pi members on their auto insurance, which benefits Tau Beta Pi whenever a member gets a quote? Members could save up to an additional 8 percent on car insurance. Also, GEICO can help you find great insurance rates on motorcycle, homeown-

ers, renters, boat, and much more. Get a free quote today to see how much you could save with GEICO. It will be a very wise decision! Visit www.geico.com/greek/tbp or call 1-800-368-2734 for your free quote.



CHAPTER ETERNAL

The condensed style of these notices of death is made necessary by Tau Beta Pi's large membership and space limitations in The Bent. You may email or write the Editor for additional facts (if available) concerning the following deceased members. The assistance of all is earnestly sought in reporting the deaths of Association members, with appropriate details, including date of death and full name. You may report the death of a member by sending an email to chapter.eternal@tbp.org.

- AL A '48 **Bostick, Shelley McDonald**; January 19, 2003.
 '49 **Beatty, Lawson Seals**; August 16, 1992.
 '49 **Holmes, Wilbur Garner**; May 8, 2011.
 '51 **Redelsheimer, Sigmund M.**; September 15, 2016.
 '52 **McBride, Robert Eugene**; August 2016.
 '52 **Pearce, Earl Hewitt**; August 5, 2016.
 '53 **Holmes Jr., George Frank**; January 21, 2013.
 '53 **Morgan Sr., Leonard Amos**; February 4, 2009.
 '54 **Hagler, Travis Jackson**; April 9, 2015.
 '59 **Whitt, Richard Elmo**; September 14, 2016.
- AL B '49 **Linsley, Edward Leavitt**; November 15, 2011.
 '50 **Long Jr., Charles Allen**; June 1, 2016.
 '58 **Arrington, Charles Ernest**; February 12, 2004.
 '58 **Massett, Joseph Lee**; July 6, 2015.
 '60 **Moody, Walter Frank**; January 27, 2011.
 '62 **Byers, James Lawrence**; June 19, 2005.
- AL Γ '51 **Poor, William Russell**; July 30, 2016.
- AZ A '52 **Wickham, James Forest**; November 16, 2015.
 '58 **Griggs, Warren Myrle**; no details.
- AZ B '85 **Whetten, Frank Leon**; July 7, 2011.
 '88 **Thorstad, Timothy R.**; February 26, 2012.
- AR A '40 **Hudson, Robert Lee**; October 17, 2015.
 '44 **Oates, Robert Franklin**; October 16, 2014.
 '50 **Bright, William Delbert**; May 31, 2012.
 '50 **Lyon, Thomas Allen**; June 22, 2016.
 '53 **Bowen, James Reece**; June 6, 2016.
 '60 **Davis Jr., Samuel Leo**; March 4, 2002.
 '67 **Willis, Fred Alan**; June 26, 2016.
 '85 **Dalton, Donald Edward**; March 26, 2012.
- CA A '44 **Harris, Robert Leighton**; March 8, 2011.
 '44 **Keller, Leroy Rupert**; April 17, 2015.
 '49 **Keezer, Derald Charles**; August 26, 2008.
 '50 **Haskell, Broderick Phelps**; February 18, 2011.
 '50 **Parker, Wendell Ray**; September 18, 2014.
 '53 **Houston, Robert Kennedy**; April 9, 2012.
 '54 **Edwards, Donald Kenneth**; May 6, 2009.
 '54 **Woods, Philip Charles**; January 5, 2016.
 '55 **Holmes, Homer Erwin**; September 17, 2000.
- CA B '43 **Morgan Jr., Samuel Pope**; May 19, 2015.
 '44 **Knemeyer, Franklin Henry**; October 15, 2014.
 '48 **Hausmann, Delbert Arthur**; August 24, 2014.
- CA Γ '50 **Youngs, Bernard DeVere**; July 3, 2011.
 '51 **Laughton Jr., Charles Stevenson**; August 29, 2016.
 '52 **Chalmers, Robert Alexander**; February 6, 2011.
 '52 **Skiles, Allen Crawford**; January 18, 2012.
 '53 **Farr, Donald Lawrence**; June 7, 2011.
 '56 **Beyer, Rodney Bringham**; March 1, 2016.
- CA Δ '49 **Spencer, Charles Allan**; November 11, 2011.
 '50 **Lancaster, Sidney Charles**; February 3, 2013.
 '57 **Cohen, Judith Love**; July 25, 2016.
- CA E '44 **Morgan, Antony John Andrew**; October 27, 1989.
 '54 **Karsten, John Alan**; no details.
 '58 **Spencer, Victor Herbert**; September 16, 2011.
 '81 **Wheaton, Philip Michael**; no details.
- CA Z '48 **Dougherty, Robert Starrs**; July 2015.
- CA I '80 **Massa, Erwin S.**; August 9, 1996.
- CA N '72 **Saucerman, James Clyde**; December 15, 2005.
- CA Ξ '81 **Humphrey, Clifford Giddings**; September 19, 2011.
 '83 **Gavron, Ronald M.**; January 16, 2011.
- CA O '59 **Clopton, Eldon Joe**; February 2, 2011.
- CA Π '78 **Lawton, Gerald Michael**; October 1, 2010.
- CA P '77 **Arnson, Allan K.**; February 23, 2012.
- CO A '47 **Wolfe, John Allen**; December 26, 1996.
- CO B '41 **Englund, James Stanley**; December 23, 2015.
 '42 **Brittin, Wesley Emil**; August 1, 2006.
 '43 **Durham, Franklin Patton**; August 25, 2011.
 '44 **Bradt, Albert Johnson**; February 16, 2011.
 '44 **Hutchinson Jr., Charles Angevine**; December 5, 2005.
 '44 **Pearson, Alvin Jerrold**; August 14, 2007.
 '44 **Wood, Richard Arthur**; October 8, 2010.
 '45 **Edwards, Donald Vance**; May 20, 2012.
 '45 **Usher, Thomas Eugene**; January 9, 2012.
 '49 **Elder, Donald Lee**; September 11, 2011.
 '50 **Combs, Luther Paul**; July 24, 2012.
 '50 **Grubin, Eugene Stanley**; November 14, 2011.
 '50 **Resen, Frederick Lawrence**; March 25, 2006.
 '51 **Akey, Donald Ellis**; September 5, 1999.
 '52 **Ball, Lloyd Duane**; February 13, 2016.
 '56 **Monnie, Darrell Ivan**; November 18, 1992.
 '57 **Viallet Jr., James Leon**; January 17, 2015.
 '59 **Pfeifer, Charles Joseph**; December 31, 2011.
 '69 **Whitesell, William Abram**; March 1, 2011.
 '75 **Hubert, Alexis**; August 19, 2011.
- CO Γ '52 **Howey, Charles Kelsey**; April 1, 2015.
- CT A '43 **Ortner, Robert Charles**; June 20, 2008.
 '44 **Fullerton, John Hubbard**; February 4, 2015.
 '50 **Broadbent, Edward Walton**; August 23, 2011.
 '50 **Merritt Jr., Thomas Wright**; May 17, 2015.
 '50 **Pratt Jr., Charles Dudley**; May 26, 2010.
- CT B '48 **Pearson, Alan H.**; April 11, 2004.
 '48 **Pierce, Francis Casimir**; October 19, 2011.
 '51 **Pearson, Arthur Gordon**; no details.
 '85 **MacKas, Daniel George**; March 7, 2011.
- DE A '47 **Rothrock, John Albert**; June 16, 2013.
 '48 **Shank, Augustus Jacob**; June 30, 1996.
 '50 **Pratt Jr., Stuart Wilkins**; October 6, 2006.
 '56 **Mandas, James John**; November 19, 2004.
- DC A '60 **Gibbs, McDonald V.**; January 1, 2016.
 '65 **Shuster, Malcolm David**; February 23, 2012.
- DC B '88 **Burns, Bernard Joseph**; January 25, 2011.
- DC Γ '69 **Packard II, William Thomas**; 2014.
 '74 **Lee, Ray Daniel**; January 22, 2011.
- FL A '44 **Cameron, Edwin Williams**; November 11, 2014.
 '50 **Brale, William Charles**; March 9, 2011.
 '55 **Roque, Edward Frank**; November 2, 2011.
 '75 **Weichbrodt, Julius R.**; October 7, 2011.
- FL B '52 **Morgan, Grady Thomas**; no details.
 '94 **Basila, Charles William**; August 28, 2011.
- FL E '07 **Moore, Joseph N.**; March 19, 2012.
- GA A '46 **Hills Jr., George Burkhart**; March 18, 2016.
 '46 **Mac-Pherson, James Reeve**; August 4, 2008.
 '47 **Spitzer, Lewis Frank**; June 29, 2014.
 '48 **Babcock Jr., Charles I.**; July 10, 2007.
 '48 **Gingles, Pat M.**; March 10, 2011.
 '48 **Raynes, Herman David**; October 28, 2011.
 '49 **Bernstein, Louis**; March 20, 2012.
 '49 **Summers, Charles Orlando**; no details.
 '53 **Bradbury Jr., William Delp**; August 28, 2007.
 '53 **Clark, Martin**; August 2, 2016.
 '54 **Traylor, Thomas Hamilton**; March 26, 2012.
 '57 **Martin, George Walter**; October 14, 2010.
 '59 **Pearson, William Boyce**; April 17, 2005.
 '59 **Reed, James Daniel**; March 4, 2011.
 '66 **Flowers, Ronald Earl**; January 29, 2015.

	'81	Norwood, Devorin Keith; October 23, 2011.		'70	Drakulich, Eli Mark; February 15, 2011.
	'88	Anderson, Peter Donald; June 11, 2016.		'84	Federle, Steven Paul; March 18, 2011.
ID A	'52	DeRose, Charles E.; November 15, 2011.	IN B	'50	Gaston, James Raymond; September 2, 2002.
	'77	Merkel, Marvin George; February 2, 2012.		'51	Kallansrude, William Eugene; March 18, 2011.
IL A	'43	Dluzen, Edward Roman; October 3, 2011.		'76	Conn, Richard Lee; September 27, 2016.
	'43	Welsh, Lloyd Byron; May 2, 2008.	IN Γ	'66	Laurendeau, Normand Maurice; May 20, 2012.
	'48	Babcock, Murray Lewis; December 28, 1999.	IN Δ	'64	Graumann, Donald William; no details.
	'48	Behler, Ralph William; February 20, 2011.	IA A	'40	Emarine Sr., Charles William; October 11, 2013.
	'52	Bost, William LaVerne; January 21, 2012.		'41	Don Carlos, Darrell Dean; March 7, 2011.
	'52	Brown, James Dell; October 26, 2011.		'41	Moore, Wayne Robert; January 29, 2012.
	'52	Koucky, Robert Willis; February 12, 2011.		'42	Schneider, Carol Francis; May 14, 2004.
	'52	Schnepper, Leon Paul; April 13, 2012.		'44	Blythe, Frederick Charles; January 26, 2011.
	'55	Baker, James Harold; November 9, 2012.		'45	Wells, Quinton Rollo; August 27, 2011.
	'55	Harvey, Thomas Nelson; May 2016.		'49	Van Ness, James E.; September 9, 2016.
	'56	Kliore, Arvydas Joseph; December 7, 2014.		'50	Brickley, Donald Grant; August 25, 2011.
	'57	Webb, George Boardman; February 10, 2011.		'50	Moore, Wendell Robert; May 10, 2005.
	'60	Baker, Robert Jethro; March 30, 2014.		'50	Morgan, Dean Milton; September 18, 2000.
	'60	Grigg, Charles Dennis; October 25, 2015.		'53	Hornback Jr., Loyd Russell; April 7, 2013.
	'61	Seidel, Boris Leroy; August 21, 2011.		'53	Kroeger, Henry Rondell; January 14, 2011.
	'62	Sample, Steven Browning; March 29, 2016.		'58	Fish, George Douglas; May 23, 2008.
	'66	Behounek, Edward Frank; October 4, 2011.		'59	Marean, Richard Wayne; October 8, 2011.
	'71	Trojan, William Thomas; August 21, 2011.	IA B	'49	Keller, Robert Graham; May 4, 2003.
	'74	Greenlee, William John; February 5, 2012.		'50	Babcock, Theodore Robert; January 12, 2001.
	'77	Marquart, David Wayne; January 14, 2016.		'55	Hoover, Richard Wayne; July 7, 2011.
	'79	Rosenbaum, David S.; May 5, 2012.		'57	Brown, Marvin Alfred; July 1, 2016.
	'85	Perko, Ronald Dean; July 28, 2012.		'59	Bicknell, Murray Scott; July 12, 2015.
	'95	Speigel, Jeffrey S.; September 10, 2011.		'66	MacHacek, Raymond Frank; January 24, 2012.
IL B	'43	Ericson, Robert Conrad; October 27, 2010.		'67	Earnest, Kenneth Roger; March 4, 2012.
	'49	Wolfe, John Francis; November 17, 2007.	KS A	'40	Brooks Jr., Frederick E.; December 25, 2015.
	'56	Friedlander, Fred Irwin; September 5, 2009.		'41	Schlegel, Thomas Arthur; November 15, 2011.
	'59	McKerlie, Clyde James; no details.		'45	White, Robert Herr; October 13, 2010.
IL Γ	'45	Wells, Donald Glenn; June 19, 2005.		'46	Chase, Albert Lindley; February 6, 2006.
	'48	Guier, William H.; August 28, 2011.		'48	Bertuzzi, Andrew Fred; February 9, 2011.
	'50	Wolfe Sr., Thomas Francis; no details.		'48	Stark, Paul William; October 26, 2011.
	'56	Bliss, James Charles; January 24, 2012.		'49	Spieth, Charles William; September 29, 2010.
	'58	Lueck, Albert Fredrick; July 4, 2016.		'49	Thomson, David Browning; April 24, 2012.
	'67	Mineck, David William; September 22, 2010.		'50	Hanaway, Paul Robert; March 23, 2011.
	'70	Vinita, Roger William; March 14, 2012.		'52	Luthye, Dale Harry; August 23, 2011.
IL Z	'90	Brady, Louis Bryan; September 30, 2010.		'53	Holman, Robert Ray; November 7, 2011.
IN A	'39	Farrow, Verle; January 21, 2001.		'57	Gossett, Willard Allen; April 16, 2012.
	'42	Boughan, Rolla Beryl; September 1, 2011.		'59	Blakely, Robert Lee; October 4, 2003.
	'42	Bradbury, Elmer Joseph; May 27, 2012.		'59	Hellman, Paul Lester; November 17, 2012.
	'42	Breedlove, Charles B.; October 18, 2010.		'69	Sheridan, Hugh Carl; September 2016.
	'42	Southmayd, Laban Howell; February 18, 2005.		'75	Wallace, David Bruce; January 28, 2016.
	'43	Purman, Joseph William; May 22, 2012.	KS B	'59	Norris, Roy Howard; November 27, 2008.
	'46	Parsons, Thomas Richard; no details.	KY A	'50	Edwards, Forest Richard; May 15, 2016.
	'47	Buchholz, Richard Fred; May 1, 2016.		'50	Kemper, Raymond Arnold; July 3, 2015.
	'47	Morgan Jr., William Evans; August 31, 2014.		'51	Nease, James Delona; March 15, 2011.
	'48	Borgmann, Earl Alphonse; December 13, 2015.		'53	Bryner, Bailey Hall; December 24, 2011.
	'48	Nack Jr., Harvey Theodore; April 15, 2014.		'56	Carey, George Burgess; October 5, 1996.
	'48	Novak, Robert Walter; May 22, 2012.		'59	Hardin, Leonard Scott; March 23, 2011.
	'48	Sutter, Thomas Ridgway; May 6, 2016.		'86	Martin, Bruce Alan; August 29, 2011.
	'48	Younger, George Gene; September 27, 2010.	KY B	'53	Briggs, Dale Edward; March 7, 2016.
	'49	Stuckman, Lowell Randles; November 26, 2011.	LA A	'41	Cameron, Charles Clifford; May 28, 2016.
	'50	Dale, Warren Hylton; October 1, 2016.		'52	Leever, Robert Edmond; September 22, 2004.
	'52	Hildebrandt, James Edwin; June 21, 2016.		'55	Matherne, Roger Vincent; June 21, 2005.
	'52	Peerson, Joseph John; April 9, 2012.		'60	Hall, Wayne Anthony; August 19, 2011.
	'52	Watkins, Eugene Alden; no details.		'61	Koonce, Jack McCarthy; January 30, 2012.
	'54	Smith, Murray Elwin; November 7, 2011.		'83	Hebert, Timothy Ray; March 4, 2012.
	'55	Fosnaugh, Billy Leon; October 11, 2015.	LA B	'42	Baer, Martin Simon; September 5, 2007.
	'57	Delude, Clifford Lee; April 27, 2012.		'49	Head, Manuel Anthony; February 14, 2014.
	'57	Johnson, Donald Wayne; August 10, 2011.		'50	Gaston, Roy Newell; April 15, 1983.
	'58	Engdahl, Gerald E.; March 14, 2012.		'50	Hardgrave, Howard David; February 25, 2012.
	'59	McLean, Douglas Hazen; September 16, 2015.		'55	Pittman, Charles Ronald; June 22, 2016.
	'59	Rossa, Leonard George; January 17, 2016.		'55	Vaughan, John Martin; June 24, 2016.
	'60	Omahan, Joel Stanley; February 9, 2011.	LA Γ	'58	Garner, Jerry Neil; September 22, 2011.
	'61	Novak, Peter Anthony; October 13, 2010.	LA Δ	'63	Des Ormeaux, Eugene Raymond; August 9, 2016.
	'62	Wilkes, Lawrence Andrew; March 20, 2012.		'67	Riche, Richard Andrew; April 14, 2012.
	'64	Ichida, Leroy Franklin; September 18, 2011.	ME A	'42	Pratt, Winthrop Bowman; April 17, 1996.
	'66	Dawson, Johnny Bruce; January 14, 2011.		'48	Smith, Robert Wortning; November 25, 2011.
	'68	Sherman, Dale Edward; January 2, 2015.		'50	Richter, Robert Allan; August 30, 2016.

- '50 Tingley, Frank Hunt; February 28, 2011.
'54 Haskell, Colwyn Fenton; March 1, 2011.
'57 Pearce, Albert Franklin; September 18, 2015.
'85 Knight, Stephen Mark; January 14, 2011.
- MD B '42 Cordyack, John Edward; September 11, 2006.
'49 Luber, Joseph Leonard; September 10, 2015.
'49 Morris, Robert Louis; April 4, 2012.
'50 Miller, Irvin Milton; January 11, 2012.
'51 Fthenakis, Emanuel John; April 3, 2014.
'57 Skaggs, Glenn Austin; May 20, 2016.
'57 Timmerman, George Harry; October 16, 2011.
'61 Tyler, Allen L.; January 15, 2011.
- MD Γ '68 Prebula, Alvin William; October 6, 2010.
'80 McGee, James Bradford; November 4, 2015.
- MA A '41 Wilson, Robert Frederick; November 18, 2011.
'43 Bakanowski, Alfred Eugene; April 3, 2012.
'46 Shank, Jack Henry; February 18, 1999.
'53 Healy, Kenneth McNeill; October 16, 2010.
'55 Dworkin, Howard Jerry; January 27, 2012.
'57 Yates, Robert Alfred; September 24, 2010.
- MA B '42 Satterfield, Charles Nelson; March 14, 2011.
'44 Haliburton, Donald Hansen; January 20, 2011.
'44 Hollister, Harold Houghton; December 18, 2008.
'44 Hoopes Jr., John Walker; June 16, 2016.
'44 Soderberg Jr., Carl Richard; no details.
'45 Cromer, Ralph Payne; September 25, 2000.
'48 Hanpeter, Robert Wilbur; January 1, 2016.
'48 Kellogg, John Hall; January 20, 2016.
'50 Mann, Robert Wellesley; June 16, 2006.
'50 Stern, Hansjoerg; February 2, 2012.
'51 Plender, Peter John; August 23, 2011.
'52 McCluskey Jr., Edward Joseph; February 13, 2016.
'52 Sydney, Stanley Haim; January 22, 2012.
'52 West, Donald Eugene; July 15, 2012.
'53 Jongbloed, Donald Jay; November 2, 2015.
'54 Stekly, Zdenek Jan Jaroslav; April 3, 2009.
'55 Moll, Sheldon Howard; November 5, 2011.
'56 Moss, Simon Charles; March 14, 2011.
'58 Graham, James William; January 14, 2011.
- MA Δ '61 Heggestad, Harold Martin; August 13, 2016.
'42 Velte, Richard G.; September 23, 2010.
'43 Clayman, Arthur; April 5, 2012.
'44 Sherry, Robert Seymour; no details.
'44 Willis, Allen Eugene; October 30, 2011.
'45 Babcock, Russell H.; October 5, 2005.
'45 Kidder, George Howell; August 20, 2009.
'46 Hovannesian, Albert Sarkis; February 10, 2016.
'49 Ripley, Donald Edward; October 16, 2010.
'54 Brinn, Walter Keenan; October 29, 2015.
- MA E '43 Skwarek Sr., Frank John; April 1, 2015.
'48 Lazuk, Albert Vincent; September 17, 2016.
'60 Powers, Nelson Ralph; January 22, 2012.
'63 Hauptmann, Robert Oscar; October 10, 2012.
- MA Z '57 Keenan, William Arthur; September 25, 2010.
'58 Crowley, Gerald Francis; February 8, 2011.
'58 Emero, Donald Herbert; August 20, 2011.
- MI A '96 Padon, Kathryn Sirovatka; March 16, 2012.
- MI B '42 Werner, Walfred Saastamoineh; April 19, 2012.
'43 Sherman, Robert Elton; February 26, 2012.
'48 Giuliani, Clarence Isadore; October 13, 2010.
'48 Kallander, John William; August 23, 2016.
'50 Williams, George Allen; March 9, 2011.
'51 Hauptman, Donald Fidelis; December 3, 2014.
'52 Drews, Charles Leonard; March 26, 2012.
'52 Wilbins, Richard George; January 8, 2012.
'53 Durfee, George Austin; February 7, 2011.
'53 McDonald, Roderick Gordon; November 4, 2011.
'58 Swenski, Donald Fred; October 22, 2010.
'61 Stafford Jr., James Raymond; April 5, 2012.
'66 Dewey, Harvey Wellington; October 9, 2010.
'68 Andreini Jr., Joseph Christopher; March 5, 2011.
'78 Spiegel, Mark Stephen; September 21, 2010.
- MI Γ '41 Battey, Herbert Bruce; December 26, 2011.
'41 Theriault, Paul William; January 24, 2011.
'42 Churchill, Stuart Winston; March 24, 2016.
'44 Harris, George Arthur; October 2, 2010.
'44 Sawyer, George Alanson; October 22, 2011.
'44 Schmidt Jr., Henry Louis; June 10, 2016.
'44 Townley, Ralph Kilby; September 23, 2010.
'47 Morgan, James Lawrence; April 26, 2014.
'48 Christensen, Harland Robert; January 7, 2011.
'48 Hirsch, Albert Edgar; January 17, 2012.
'48 Waterbury, William Russell; April 2, 2013.
'50 Bucciero, Henry Robert; September 15, 2011.
'50 Ritenour, Ray Lester; December 29, 2011.
'50 Weil, William M.; December 6, 2011.
'51 Oltman, John Harold; January 8, 2011.
'52 Story, Martin Walker; April 25, 2015.
'53 Firth, Donald Edgar; May 25, 2012.
'57 Hollister, Robert Earl; June 9, 2015.
'59 Cumming, Richard Alan; April 2, 2006.
'59 Perpich Sr., William Michael; January 29, 2011.
'63 Hamma, John Francis; March 9, 2014.
'63 Piatkowski, Stanley Leonard; June 3, 2016.
'64 Bailey, Bruce; December 25, 2011.
'64 Fahselt, Robert George; January 11, 2006.
'67 Vrieland, Bruce Calvin; February 23, 2012.
'68 Noble, Mark Mitchell; August 29, 2014.
'72 Hockaday, Edwin Joseph; October 18, 2011.
- MI Δ '49 Gaughan, William Francis; March 2, 2011.
'50 Trease Sr., Ralph Edward; May 22, 2016.
'51 Head Jr., Herberth Edward; December 15, 2011.
'51 Waggoner, James Robert; June 19, 2016.
'58 Testin, Robert Francis; April 22, 2015.
'61 Bertolino, Anthony V.; April 18, 2015.
'62 Glomski, Arthur Frank; January 20, 2004.
'65 Joering, Everard Anthony; November 17, 2011.
'73 Pesta, Anthony John; November 10, 2012.
- MI E '51 Cutler, Hymie; February 27, 2013.
'53 Gregory, Anthony John; March 4, 2011.
'54 Ferrari, Harry Max; August 3, 2016.
'66 Lelke, Helmut; May 3, 2013.
'67 Delaporte, Dany Paul; February 16, 2011.
'73 Wieczorek, Walter Francis; September 6, 2011.
- MI Z '59 Born, Gerald Charles; October 12, 2011.
'76 Novis, Stanley Robert; January 19, 2011.
- MI H '81 Sherlock Jr., John; October 8, 2010.
'91 Shellman, William Charles; January 28, 2012.
- MI ⊕ '94 Wierzbicki, John Walter; December 3, 2011.
- MN A '34 Anthes, John Allen; April 1, 2015.
'41 Harden, Carl Morse; May 4, 2007.
'47 Ward, Elmont Charles; October 10, 2010.
'48 Lundberg, John Lauren; September 2, 2011.
'53 Pfender, Emil; January 28, 2016.
'54 Moy, William Arthur; May 30, 2016.
'65 Goedert, Raymond Peter; February 14, 2011.
- MS A '39 McRoy, Wallace James; October 8, 2016. [Cent. 122]
'47 Pratt, Edwin Berkley; March 25, 2007.
'49 Jones, Robert Presley; September 10, 2016.
'50 Brown Jr., Joe Lancaster; October 29, 2010.
'50 Pratt, James Robert; January 10, 2009.
'56 Ashcraft, Donald Lee; September 6, 2011.
'56 Bethay, Joseph Arwood; August 22, 2016.
'88 Tyson, Glenn Morris; October 17, 2010.
- MO A '48 Craig Sr., Robert George; December 12, 2008.
'49 Keller, Paul; November 18, 2008.
'50 Smith, Martin Ralph; December 12, 2011.
'51 Pearson, William Eugene; September 2, 2000.
'56 Fink, Earl Ralph; August 28, 2016.
'57 Darden, James Robert; no details.
'62 Behle, Theodore Louis; January 22, 2011.
'65 Camburn, Gilbert L.; January 9, 2016.
'84 Johnson, Paul Richard; January 12, 2011.
- MO B '41 Summers, Allan Joseph; no details.

- '45 **Henry, George Edward**; February 10, 2012.
 '45 **Shank, Earl Melvin**; January 10, 2011.
 '47 **Johnson, Virgil Albert**; September 27, 2010.
 '48 **Boaz, Leonard Richard**; January 12, 2012.
 '48 **Sphar, Curtis William**; January 26, 2011.
 '49 **Hogland, Virgil Wesley**; March 4, 2012.
 '49 **Holmes, Gerald Doss**; March 12, 2016.
 '49 **Laird, Edward William**; September 25, 2010.
 '49 **Magruder, William Howard**; September 7, 2013.
 '49 **Marting, Richard Erwin**; January 9, 1999.
 '49 **Wolfe, Clarence Lee**; March 2, 1989.
 '50 **Hillhouse, David Leslie**; December 20, 2010.
 '51 **Robotti, Richard Robert**; February 2, 2012.
 '52 **Pawloski, Bernard Louis**; January 30, 2011.
 '52 **Vickers, Edward Lafayette**; September 4, 1989.
 '53 **Gilbreath, Rodney Earl**; September 13, 2011.
 '53 **Schemel, John Henry**; November 19, 2015.
 '54 **Geisler, William F.**; October 24, 2011.
 '55 **Keller, Leonard James**; November 27, 1999.
 '57 **Dowden Jr., Clarence Livingston**; January 11, 2011.
 '58 **Hager, Chester Leroy**; May 14, 2012.
 '59 **McCormick, Ralph Wayne**; no details.
 MO Γ '43 **Beckmann, Ralph Charles**; February 17, 2012.
 '47 **Darigo, Carl Edward**; January 27, 2012.
 '48 **Moyer, Joseph Richmond**; February 15, 2012.
 '49 **Wesley, John Keene**; January 25, 2011.
 '51 **Wood, Galen Theodore**; December 21, 2011.
 '59 **Krone, William John**; September 14, 2011.
 '80 **Resnick, Gary Lee**; November 22, 2011.
 '05 **Woods, Mark Joseph**; February 23, 2011.
 MT A '41 **Herrick, Elbert Charles**; April 19, 2006.
 '49 **Weaver, James Elmer**; July 4, 2011.
 NE A '50 **Splinter, William Eldon**; September 26, 2012.
 NV A '92 **Hopman, William Floyd**; January 11, 2011.
 NH A '48 **Burkholder, Richard W.**; March 19, 2011.
 '50 **Palmer, Ansell Walter**; March 1, 2011.
 '51 **Demers, Edward Arthur**; September 15, 2001.
 '58 **Bryant, William Ernest**; August 28, 2011.
 '59 **Brown, Earl John**; March 27, 2012.
 '59 **Murray, Richard Joseph**; February 6, 2011.
 '64 **Einbinder, Sidney**; December 2, 2011.
 NJ A '42 **Gilligan, Bernard Frederick**; May 4, 1994.
 '43 **Brunton, Harold**; July 7, 2016.
 '45 **Holmes, James Robert**; September 13, 2011.
 '46 **Shulock, Charles**; November 11, 2011.
 '50 **Lipton, Sydney**; June 21, 2014.
 '51 **Kinlin, Thomas E.**; October 23, 2011.
 '86 **Levesque, Kenneth Joseph**; July 6, 2011.
 NJ B '42 **Bauer, William H.**; February 16, 2015.
 '48 **Ross, Robert David**; October 5, 2016.
 '49 **Campbell, Donald Clarence**; January 11, 2011.
 '50 **Dunlop, Robert Brownlie**; January 20, 2015.
 '50 **Fitzpatrick, Gordon Mount**; 2015.
 '50 **Kravet, Laurence S.**; March 23, 2011.
 NJ Γ '36 **Cherry, Sidney John**; September 16, 2011.
 '42 **Dorian, Richard M.**; May 24, 2001.
 '48 **Carella, Daniel John**; February 2, 2012.
 '48 **Nagel Jr., John**; January 27, 2011.
 '49 **Blendermann, Louis Herman**; no details.
 '52 **Rinald, Donald Frederick**; January 11, 2016.
 '54 **Morgan, Alfred Samuel**; February 11, 1998.
 '67 **Krysiak, William John**; August 29, 2016.
 '67 **Walters, Brian David**; August 17, 2016.
 '73 **Boyer, Richard William**; January 10, 2011.
 NJ Δ '54 **Campbell Jr., Carl Merritt**; June 26, 2011.
 NM B '83 **Holladay, April Shirley**; February 21, 2011.
 NY A '43 **Englar, Kenneth Gooday**; March 2, 2010.
 '48 **Grasso, Natale J.**; January 14, 2015.
 NY B '41 **Wolfe, Albert LeRoy**; January 31, 2007.
 '43 **Herzog, Paul William**; March 15, 2011.
 '43 **Mather, Douglas Ledyard**; May 14, 2006.
 '52 **Farley, John Michael**; February 22, 2011.
 '55 **King, Fred Neil**; March 18, 2011.
 NY Γ '42 **Gaylord, Lewis Eugene**; January 19, 2011.
 '42 **Gilmore, Charles Lee**; August 27, 2016.
 '46 **Ahlin, Arthur Stewart LeRoy**; July 21, 2012.
 '49 **Hunggrford Jr., Philip Clark**; January 28, 2014.
 '49 **Mansfield II, Frank Maximilian**; March 7, 2005.
 '49 **Wells, William Benjamin**; May 21, 2012.
 '50 **DeGhetto, Kenneth Anselm**; September 27, 2016.
 '50 **Lueders, Robert Edward**; January 31, 2012.
 '50 **Munson, Stuart Edwin**; April 19, 2012.
 '51 **Flowers, Theodore Robert**; January 4, 2010.
 '51 **Rich, Roy Lester**; June 8, 2016.
 '51 **Stehlik, Joseph Dennis**; March 10, 2011.
 '52 **Blumenthal, Irving Simon**; November 1, 2004.
 '52 **Cheney, William Hills**; July 15, 2010.
 '53 **Wagner, Walter Richard**; December 5, 2011.
 '54 **Rieke Jr., William Frederick**; October 3, 2015.
 '55 **Pearsall, George Wilbur**; February 21, 2016.
 '60 **Rhoades, Richard Gardner**; September 1, 2016.
 '66 **Clarke, William Henry**; July 12, 2016.
 '67 **Byron, Jeffrey William**; January 28, 2011.
 NY Δ '44 **Pearson, William Frank**; October 17, 2000.
 '48 **Benedict, David C.**; August 26, 2016.
 '51 **Loeffler, Frank Joseph**; July 27, 2008.
 NY E '36 **Strollo, George Francis**; April 6, 2016. [Cent. 110]
 '47 **Wynne Jr., Donald Thomas**; February 15, 2012.
 '49 **Ort, Harold**; April 25, 2016.
 '54 **Aker, Donald C.**; October 19, 2010.
 '60 **Weingold, Harris David**; September 27, 2011.
 '62 **Whealan, Robert Benedict**; April 2, 2016.
 NY Z '48 **Wolfe, Henry P.**; March 20, 2011.
 '55 **Bornscheuer, George Charles**; December 14, 2011.
 '55 **Dollard, Peter Morley**; October 30, 2011.
 '57 **Aaronson, Gerald**; March 20, 2016.
 '62 **Du Bouchet, Andres Vincent**; February 21, 2011.
 NY H '39 **Steady, Robert Evans**; January 18, 2011.
 '42 **Grasso, Anthony Joseph**; August 25, 2007.
 '44 **Marshall, Louis**; July 5, 2016.
 '44 **Schildcrout, Murry**; July 25, 2010.
 '50 **Altman, Harry**; no details.
 '50 **Glaser, Myron Barnard**; June 28, 2011.
 '52 **Kaufer, George Eliot**; April 14, 1994.
 '52 **Silverman, Ronald**; December 20, 2015.
 '44 **Munson Jr., Dewey John**; May 18, 2015.
 NY Θ '47 **Flower, Robert Alban**; June 6, 2010.
 '48 **Mader, Frederick William**; December 12, 2008.
 '48 **Stevenson, Benjamin Franklin**; January 3, 1996.
 '50 **List, Rudolph Joseph**; April 3, 2016.
 '55 **Pratt, William Howard**; November 22, 2013.
 '61 **McWharf, John Edward**; January 17, 2011.
 '64 **Taylor, William Leon**; June 6, 2016.
 NY I '49 **Uhl, Wilfred O.**; June 7, 2015.
 '50 **Fisher, Bernard Irwin**; July 11, 2010.
 '58 **Schweitzer, Stanley**; August 30, 2011.
 '61 **Lune, Marvin**; April 27, 2012.
 '67 **Kiser, Joseph Harold**; April 29, 2014.
 NY K '49 **Craig, George Edwin**; December 15, 1999.
 NY Λ '49 **Goodman, William Paul**; March 2, 2011.
 '80 **Connors, Patrick Jeremiah**; February 11, 2011.
 NY M '59 **Lutz, Leroy Richard**; December 29, 2011.
 '02 **Kline, Seth Robert**; August 29, 2011.
 NY N '50 **Drescher Sr., Donald Oliver**; December 28, 2011.
 '50 **Yondt, Sheridan Albert**; August 14, 2015.
 '54 **Koncsol, Alexander Elmer**; April 2014.
 '55 **Knapp, Richard W.**; no details.
 NY Ξ '83 **Werper, Lawrence C.**; November 11, 2011.
 NC A '49 **Autry Jr., Von**; January 10, 2010.
 '49 **Keller, Charles Robert**; October 1, 2006.
 '51 **Blalock, William Hardy**; July 21, 2015.
 '54 **Pearson, Johnnie Leon**; April 18, 1998.
 '58 **Pearson Jr., James Roy**; March 9, 1999.
 '59 **Bost, James Franklin**; October 12, 2007.

'60 **Evans, Monroe Ernest**; September 2, 2006.
'61 **Schermerhorn, Donald Francis**; February 9, 2016.
'65 **Flowers, Gerald E.**; September 24, 1991.
'69 **Smith, Neill Stephen**; September 17, 2010.
'03 **Hoefen, Bret Daniel**; November 12, 2011.
NC Γ '56 **Proctor, James Faust**; May 3, 2015.
ND A '50 **Albertson, Vernon Duane**; June 6, 2015.
'53 **Peters, Loren William**; March 5, 2011.
'57 **Rothfusz, Ralph Wayne**; September 17, 2010.
OH A '64 **Nelson, Albert Barry**; December 29, 2011.
'43 **Reitz, John Richard**; July 29, 2014.
'44 **Garman, Kenneth Calvin**; May 9, 2016.
'46 **Glaser, Donald Arthur**; February 28, 2013.
'49 **Welch, Charles Paul**; December 16, 2015.
'50 **Coppock, Richard Arden**; July 8, 2011.
'50 **Selleck, Robert Earl**; September 9, 2011.
'50 **Thoman, Richard Edwin**; October 23, 2010.
'51 **Brainard, Ralph Carter**; June 30, 2013.
'51 **French, Park**; February 16, 2011.
'53 **Wolfe Jr., George**; February 24, 2011.
'58 **Semancik, John Richard**; December 1, 2015.
'61 **Tozer, Richard Fordyce**; February 19, 2016.
'69 **Graham, Roland Ralph**; December 27, 2015.
OH B '41 **Walter, George Winton**; no details.
'50 **Wolfe, Richard Edward**; February 25, 2007.
'51 **Bradbury, Byron Wilson**; no details.
'51 **Phillips Sr., Richard Elliott**; June 7, 2016.
'52 **Nesbitt, Frederick Charles**; May 11, 1999.
'59 **Stalnaker, Harold David**; September 16, 2011.
'62 **Marshall, William Waylan**; October 7, 2011.
OH Γ '67 **Kallio, James Arnold**; October 9, 2011.
'42 **Flower, Robert Lindsay**; June 2, 2005.
'42 **Jones, Evan Lloyd**; July 21, 2012.
'43 **Dunson, Philip McKay**; March 20, 2004.
'49 **Larkin, Evan Daniel**; December 8, 2015.
'51 **Armstrong, Robert James**; September 4, 2016.
'51 **Weiser, Robert Bruce**; February 26, 2012.
'53 **Krohn, Robert Lawrence**; September 5, 2001.
'59 **Luke, Theodore Edward**; January 21, 2011.
'63 **Snyder, Robert L.**; September 1, 2011.
'69 **Regner, John LaVerne**; May 5, 2016.
OH Δ '49 **Urban, John**; no details.
'50 **Requarth, Harold William**; July 1, 2016.
OH E '47 **Steiner, Richard Ray**; January 14, 2012.
'57 **Bathen, Robert Eugene**; May 15, 2016.
'65 **Martin, Elmer Andrew**; November 27, 2005.
'69 **Troth, Paul H.**; March 5, 2012.
OH Z '55 **Stapp, Edward Earl**; February 6, 2016.
'60 **Biglin, Duane Owen**; August 28, 2011.
'65 **Little, Ronald R.**; March 11, 2011.
'68 **Moser, Richard Allen**; January 29, 2016.
OH H '57 **Heuser, George Melvin**; March 17, 2011.
OH Θ '68 **Wurzelbacher, Pall Louis**; September 20, 1997.
OH I '43 **Abele, Ernest**; January 14, 1996.
OH Λ '85 **Shaffer, Stephen Garrett**; October 5, 2010.
OK A '41 **Morgan, John Victor**; October 25, 1996.
'47 **Harris, Robert Lee**; February 14, 2014.
'48 **Morgan, Jack Allen**; December 22, 2005.
'49 **Adams Jr., Lee Allen**; May 10, 2014.
'49 **Anderson, James Kerr**; May 26, 2016.
'50 **Pratt Jr., Charles Minter**; June 23, 2003.
'50 **Sanders, John Loren**; May 12, 2013.
'55 **Box, James L.**; March 26, 2016.
'58 **Altman, Charles G.**; January 21, 1996.
'60 **Poe, Robert Charles**; August 19, 2016.
'75 **Ballard, Thomas Larry**; January 17, 2011.
'80 **Butler, Robert Leonard**; February 21, 2011.
OK Γ '53 **Holmes, Frank Mitchell**; March 12, 1997.
OR A '44 **Arenz, Robert James**; November 15, 2011.
'47 **Lee, Robert Lora**; January 23, 1999.
'48 **Bocek, Mark George**; February 14, 2011.
'48 **Young, Byron Ulysses**; August 27, 1994.
'49 **Ferguson, Chester Haynes**; July 22, 2012.
'49 **Firestone, Harold LaVerne**; July 26, 2015.
'50 **Grafe, Willis Raymond**; July 17, 2016.
'51 **Edwards, Allen Carl**; April 28, 2003.
'52 **Moffette, Thomas Robert**; April 23, 2016.
'57 **Smith, Richard Nelmes**; February 5, 2016.
'61 **Wyatt, Harry Gilmore**; March 12, 2011.
PA A '40 **Morse, Norman Lester**; April 13, 2016.
'41 **Dietz, Richard Milton**; November 11, 2012.
'43 **Johnson, Donald Seiz**; June 26, 2016.
'47 **Baum, John Furley**; October 27, 2010.
'49 **Petrone, John James**; April 1, 2012.
'49 **Segraves, John Walter**; November 6, 2012.
'53 **Maloney, William John**; January 24, 2012.
'53 **Randel, Roderick Garfield**; July 10, 1994.
'55 **Bachofer, Bruce Theodore**; November 25, 2011.
'55 **Greener, Alan Edward**; April 21, 2016.
'58 **Durn, Larue Roland**; December 6, 2015.
'78 **Ryskamp, Richard Post**; September 2015.
PA B '41 **Abbey, William Frank**; July 22, 1989.
'41 **Geiser, Melvin Earl**; August 5, 2001.
'48 **Nesbitt, John Bentley**; November 21, 2008.
'51 **Burg, Stoddard Simpson**; July 25, 2016.
'52 **Pfeiffer, Sigmund Brillinger**; March 7, 2014.
'55 **Jones, Robert Paul**; September 10, 2016.
'58 **Banning, Robert Wendell**; June 25, 2013.
'58 **Sanders, Armand Edward**; May 11, 1989.
'63 **Wolf Jr., Warren Walter**; April 25, 2014.
'80 **Reed, Daniel Edward**; September 19, 2010.
PA Γ '53 **Keller, Charles Thurston**; June 25, 1989.
'54 **Laynor, John Edward**; December 25, 2015.
'54 **Pratt, Val Walter**; March 18, 2009.
'55 **Crawford, James Darwin**; May 13, 2016.
'71 **Wantzelius, Paul Otto**; September 30, 2010.
PA Δ '42 **Orttung, Frederick William**; no details.
PA E '41 **Cheney, Charles Paul**; August 26, 2005.
'41 **Reichard, Harold Forrest**; November 2, 2012.
'41 **Steele, John Henry**; May 28, 2003.
'49 **Zemgulis Jr., Stanley K.**; August 24, 2016.
'51 **Barbor, Richard Parry**; October 17, 2011.
'68 **Kennedy, Ronald Kenneth**; November 16, 2011.
PA Z '42 **Koerwer, Richard John**; February 8, 2012.
'43 **Scheffey, Charles Frank**; August 23, 2014.
'48 **Kauffman, John G.**; August 26, 2011.
'51 **Thompson, Gregory LaVerne**; January 13, 2012.
'57 **Rogers, Herbert Lewis**; February 17, 2011.
'60 **Collins, Henry Edward**; February 9, 2012.
'83 **Hahn, Joseph P.**; October 4, 2011.
PA H '51 **Young, John David**; December 21, 2011.
PA K '43 **Myers, Philip**; November 15, 1987.
'44 **Murakami, Tomomi**; September 7, 2011.
PA Λ '75 **Dickson, Keith Robert**; May 5, 2012.
PA M '15 **Roney, Brandon Charles**; August 1, 2016.
PR A '44 **Brau, Herminio M.**; June 6, 1998.
RI A '61 **Crofut, Walter Andrews**; January 8, 2012.
RI B '58 **Spink, Sydney Arnold**; August 29, 2016.
'81 **MacInnes, Craig Scott**; September 11, 2011.
SC A '44 **McWhite, Benson Carwile**; January 31, 2015.
'51 **Wolfe, Robert Martin**; December 11, 2009.
'59 **King, Earl Leslie**; March 12, 2012.
SC B '59 **Cathey Jr., Wade Thomas**; July 7, 2016.
SD A '81 **Hohn, Paul Patrick**; August 21, 2016.
TN A '49 **Picklesimer, Marion Lewis**; November 20, 2011.
'50 **Brown, John Buchanan**; June 17, 2016.
'50 **Henshaw, Jack Alonzo**; January 17, 2012.
'53 **Rosenberg, David**; March 2, 2015.
'54 **Sommerfeld, Kenneth Walter**; June 30, 2016.
'58 **Keller, James William**; March 12, 1991.
'59 **Pratt, Donald Malcolm**; April 13, 2009.
'60 **Goodpasture, David William**; September 14, 2016.
'70 **Rice, Robert Wayne**; February 1, 2012.
'71 **Swain, William Thomas**; July 29, 2016.

- '72 **Jenkins, Ronald Wayne**; July 7, 2016.
 '76 **Haynes Jr., Richard F.**; August 13, 2016.
 '76 **Whatley, Susan Craven Keith**; July 24, 2016.
 '05 **Langston, Glen Douglas**; July 26, 2016.
 TN B '47 **Akers, William B.**; August 27, 2016.
 '49 **Smith, Duncan Langdeau**; October 7, 2010.
 '55 **Jackson Jr., Harold Edward**; 2016.
 '88 **Ramsey Jr., Donald Clayton**; August 16, 2016.
 TN Γ '53 **Harbison, Finley Wren**; July 16, 2016.
 '69 **Douglas, Donald LaVelle**; February 21, 2012.
 TN E '58 **Stone, Robert H.**; July 1, 2016.
 '85 **Russell, Gregg Vincent**; March 8, 2011.
 TX A '43 **Cullum, Landon Haynes**; March 31, 2014.
 '44 **Chew, Ju-Nam**; June 15, 2012.
 '46 **Yamamoto, Roy Hideo**; September 17, 2010.
 '48 **Levander, Dale Hott**; September 11, 2011.
 '48 **Smith Jr., Cecil Hiawatha**; May 29, 2015.
 '50 **Timmons, James Carlton**; March 7, 2011.
 '51 **Fritz, Julius Alfred**; December 14, 2011.
 '51 **White Sr., William Thomas**; August 2016.
 '59 **Bagwell, James Roy**; September 21, 2012.
 '62 **Born, George Henry**; January 21, 2016.
 '64 **Herring, Robert Jack**; July 13, 2011.
 '64 **Meyer, Alvin Harold**; September 22, 2016.
 '81 **Meyers, Bruce Allen**; February 19, 2012.
 TX B '42 **Prickett Jr., Tom**; April 10, 2013.
 '42 **Svetlik, Joseph Frank**; October 1983.
 '45 **Wulfjen, Maxine M. Craddock**; December 8, 2011.
 '50 **Craig, John Paul**; July 2, 2011.
 '52 **Campbell, Stanley Steve**; May 10, 2016.
 '55 **Holmquest, Charles A.**; May 19, 2012.
 '62 **Guthrie, Terry Laverne**; February 16, 2011.
 '94 **White, Kelly John**; January 15, 2011.
 TX Γ '41 **Rumbel, Keith Ellis**; March 8, 2008.
 '43 **Leedom Sr., John Nesbett**; May 31, 2011.
 '44 **Shackelford Jr., Lewis Lemuel**; December 13, 2008.
 '44 **Braden, Patrick O'Connor**; June 16, 2016.
 '52 **Martin, Howard William**; September 26, 2010.
 '84 **Evans, Clinton Alan**; November 3, 2011.
 TX Δ '42 **Autry, Joseph Wayne**; September 27, 2005.
 '44 **Sommer, Helmut**; December 8, 2011.
 '48 **Vinson, George Larry**; March 16, 2011.
 '49 **Cartwright Jr., Edwin Orville**; September 30, 2010.
 '49 **Keller, Henry Jacob**; December 1, 1997.
 '49 **Schultz, Wilburn Ernest**; April 22, 2012.
 '51 **Blackwell, William Ray**; August 22, 2011.
 '54 **Hughes, James Michael**; April 1, 2016.
 '55 **Nesbitt, Ray Ben**; February 15, 2014.
 '57 **Haines, Charles Robert**; August 26, 2011.
 '58 **Douglass, Robert**; February 24, 2011.
 '58 **Earle, Bruce Bradley**; February 10, 2012.
 '58 **Hebert Jr., Joseph**; 2014.
 '59 **Gregson, John Clay**; February 28, 2011.
 '60 **Helms, Stanley Warren**; February 4, 2011.
 '65 **Faulk, Danny Joe**; November 22, 2011.
 TX Z '69 **Scheifley, John Charles**; April 4, 2004.
 TX Δ '74 **Spangler, Patrick Gene**; January 31, 2011.
 UT A '33 **Ramo, Simon**; June 27, 2016. [Cent. 106]
 '42 **Orton, Howard Earl**; September 1, 2003.
 '43 **Mercer, Marne LeRoy**; June 18, 2012.
 '55 **Okamoto, Howard Kazuo**; 2016.
 '60 **Morgan, Doyle Kay**; January 17, 2007.
 UT B '78 **Anderson, Dale Owen**; February 8, 2011.
 VT A '74 **Bingel, Bernard J.**; July 10, 2016.
 VA A '52 **Ivy Jr., Edward Lee**; January 11, 2011.
 '54 **Ladson, Charles Louis**; December 29, 2011.
 '59 **Stansell, Robert William**; September 28, 2011.
 '60 **Christopher, Maxwell George**; October 29, 2011.
 '74 **Lyell, Jerry Carlos**; March 8, 2016.
 VA B '35 **Nelson, William Wingfield**; May 4, 2007.
 '44 **Howell III, Francis Kitchell**; January 28, 2000.
 '45 **Puryear, William Hugh**; March 17, 2016.
 '47 **Dreelin, Andrew Michael**; January 23, 2011.
 '49 **Spitzer, Charles Edgar**; May 3, 2013.
 '50 **Keller, Donald Lee**; October 11, 1993.
 '51 **Pollak Jr., Philip**; June 12, 2016.
 '53 **Gordon, John Petersen**; June 24, 2016.
 '53 **Marks Sr., Bryant Mayes**; February 9, 2008.
 '54 **Ferratt Jr., John Powell**; January 5, 2016.
 '59 **Rhodes, Smith Albert**; no details.
 '63 **Duncan, Rodney Lee**; September 2, 2016.
 '64 **Irving, William Fain**; June 17, 2016.
 VA Δ '41 **Louthan Jr., Frank Garrett**; April 12, 2016.
 '48 **Williams, John Dickinson**; October 11, 2016.
 WA A '41 **Dean, Edward Nelsjon**; December 6, 1972.
 '46 **Geisert, William Otto**; August 29, 2015.
 '48 **Holmes, David Harold**; October 23, 2013.
 '49 **Holmes, William Harlan**; December 16, 2012.
 '50 **Holderman, Hubert Hillhouse**; October 1, 2009.
 '55 **Metter, Raymond Ernest**; October 5, 2010.
 '56 **Meldahl, Kenneth Roald**; September 30, 2010.
 '56 **Morgan, Wesley Bryant**; June 9, 2013.
 '60 **Chinn, Tony Yock**; January 31, 2016.
 '64 **Ward, Wallace Elmer**; February 27, 2015.
 '80 **Roberts, John Warren**; October 24, 2008.
 '81 **Ford, Janice Lynn**; October 27, 2011.
 WAB '47 **Jizba, Jaroslav Zdenek**; September 30, 2005.
 '49 **Johnson, Lorrin Wesley**; September 23, 2011.
 '56 **Anderson, Vernon Leroy**; March 10, 2012.
 WV A '50 **Riffee, Charles Amos**; February 26, 2004.
 '67 **Burt, David Weir**; September 22, 2010.
 '73 **Dragovich, Timothy Gale**; September 21, 2011.
 WI A '43 **Wilk, Stanley Henry**; March 3, 2012.
 '44 **Wetzel, Roland Herman**; July 20, 2016.
 '45 **Pearson, Herbert Roland**; July 22, 2008.
 '47 **Hoefs, Ralph Howard**; December 20, 2004.
 '47 **Holmes, Vet Vernon**; September 3, 2002.
 '47 **Procknow, Donald Eugene**; July 1, 2016.
 '48 **Verlo, Clayton Carl**; February 1, 2011.
 '49 **Hendricks, Alden Philip**; April 9, 2000.
 '49 **Pickering, David Lowell**; July 16, 2014.
 '50 **Coonen, James W.**; August 30, 2007.
 '51 **Auble, Carmon Myers**; January 22, 2008.
 '51 **Derber, Donald William**; May 9, 2016.
 '51 **Kaneshige, Harry M.**; May 26, 2016.
 '51 **Munson, John Franklin**; February 10, 2008.
 '53 **Page, William Herbert**; January 26, 2011.
 '54 **Greenkorn, Robert Albert**; June 13, 2016.
 '57 **Buss, Jerrold Leslie**; no details.
 '59 **Dutton, John Harrison**; June 5, 2010.
 '60 **Donohoo, Daniel John**; January 9, 2011.
 '61 **Thelen, William**; January 13, 2012.
 '62 **Wagner, Walter A.**; September 20, 2010.
 '72 **Glidewell, Donnie Dwight**; January 29, 2011.
 WI B '41 **Kilker, John George**; February 3, 2011.
 '43 **Hohnl, Kurt Ernst**; March 1, 2012.
 '46 **Schmidt, Stanley Francis**; August 13, 2015.
 '49 **Gilg, Charles George**; October 1, 2010.
 '49 **Klockow, William Clarence**; January 8, 2012.
 '50 **Flaim, Joseph John**; March 4, 2011.
 '51 **Reak, B. Bennett**; September 22, 2016.
 '52 **Giffhorn, Donald Anthony**; February 14, 2011.
 '52 **Poklar, John Joseph**; April 25, 2015.
 '53 **Malek, James Edward**; December 28, 2011.
 '58 **Rolf, Richard Lawrence**; January 31, 2012.
 '62 **Ekstrand, William N.**; March 5, 2012.
 WI Γ '88 **Schimp, Lisa Luanne**; February 13, 2011.
 WY A '91 **Meena, Jack Matthew**; June 16, 2016.

Tau Beta Pi Headquarters would like to express our sincere thanks to R. Wilson Rowland, MD B '51, for his continuous service in providing information for our Chapter Eternal section. If anyone would like to provide assistance, please contact HQ.



ALUMNI NOTES

California Sigma

Stephen H. Foulger, Ph.D., '90, is director of Clemson University's center for optical materials science and engineering technologies. The National Science Foundation has given him a \$6 million grant for research into



whether nanoparticles can treat brain disorders such as addiction and depression. Foulger and his researchers will look at creating nanoparticles many times smaller than the width of a human hair that can be coated and ingested and then sent to light-sensitive areas of the brain where they'll be stimulated by X-rays to alter brain function.

Colorado Delta

Rick S. Dennison, '79, is offensive coordinator of the Denver Broncos. He earned B.S. and M.S. degrees in civil engineering from Colorado State, where he was a football letterman. Dennison then played for the Broncos as a linebacker from 1982-90 and appeared in three Super Bowls (XXI, XXII, and XXIV). He has been a player and coach for 25+ years, including the special teams coach for the Super Bowl champion Broncos in 1997 and 1998.



Florida Epsilon

Larry M. Smith, P.E., '87, has been inducted as the 2016-17 president of the Florida Engineering Society, which is currently celebrating its 100th anniversary and is the largest state society of the National Soci-



ety of Professional Engineers. He is president of Smith Engineering Consultants, Inc., which he founded 17 years ago.

Indiana Alpha

James A. Krozel, Ph.D., '85, has been appointed associate editor for the recently formed *AIAA Journal of Air Transportation*. It is devoted to the dissemination of original papers on developments in air traffic management and aviation. The appointment runs through December 2019. Krozel is chief scientist at the Innovation Laboratory, Inc., specializing in the impact of weather on air traffic management.



Kansas Alpha

Joel T. Abrahamson, Ph.D., '06, is a senior applications engineer with 3M. He develops new adhesives for organic light emitting diode (OLED) displays, to give mobile phones higher contrast, better color, and longer battery life. Joel's previous research also advanced applications of nanomaterials for electronics and energy. He lives with his spouse and two children in St. Paul, MN.



Michigan Delta

Lawrence T. Drzal, Ph.D., '67, has received the 2016 medal of excellence in composite materials from the University of Delaware. He is a distinguished professor of chemical



engineering and materials science at Michigan State University, where he is also director of the composite materials and structures center. Drzal co-founded XG Sciences, Inc., currently the world's largest manufacturer of graphene nanoplatelets using processes developed in his lab at MSU.

Missouri Beta

Braden T. Lusk, Ph.D., P.E., '00, has returned to his alma mater, Missouri University of Science and Technology, as chair of the mining and nuclear engineering department. He had been a professor of mining engineering since 2006 at the University of Kentucky, where he also served as director of graduate studies for the department.



New York Beta

Mary A. Spio, '98, is an aerospace engineer and founder of Ceek VR Inc., a platform that brings social events to life through virtual reality, using any VR headset. She was recently named alongside Oprah Winfrey as one of NBC News/The Grio's 100 History Makers in the Making. Spio is a recipient of the Yueh-Ying Hu Memorial National Award for Innovation and the Boeing Outstanding Achievement in Electrical Engineering Award.



New York Gamma

Donald J. Polmann, Ph.D., P.E., '79, has been appointed as a member of the Florida Public Service Commission. He has been a senior manager at Atkins, an international design



and engineering firm, and previously worked for 18 years at Tampa Bay Water (formerly known as the West Coast Regional Water Supply).

New York Xi

Dorothy A. Cudia, '84, has been named vice president of food service equipment provider Middleby Automated Solutions, where she will focus on robotics, 3D printing, and autonomous systems. She previously held senior positions with Nabisco Brands in automation and process control, McDonald's Corp. in engineering and capital equipment, and most recently at Darden leading innovation across the supply chain for food, energy and capital equipment.



held senior positions with Nabisco Brands in automation and process control, McDonald's Corp. in engineering and capital equipment, and most recently at Darden leading innovation across the supply chain for food, energy and capital equipment.

New York Omicron

Edward J. Ognibene, Ph.D., '89, has joined Rapid Micro Biosystems of Lowell, MA, a leading provider of automated, non-destructive, rapid microbial detection as vice president of product development. He was previously director of engineering/systems development at Waters Corporation in the separation systems division, where he successfully managed the R&D and engineering teams from the acquisition of Thar Instruments, Inc., as well as integrating them into the broader corporate organization.



Lowell, MA, a leading provider of automated, non-destructive, rapid microbial detection as vice president of product development. He was previously director of engineering/systems development at Waters Corporation in the separation systems division, where he successfully managed the R&D and engineering teams from the acquisition of Thar Instruments, Inc., as well as integrating them into the broader corporate organization.

North Carolina Gamma

Eric D. Diebold, Ph.D., '04, is president of Omega Biosystems, Inc., which he founded in 2014 in Los Angeles, CA. He is focusing on the biomedical applications of optical physics and electrical engineering,



markets.

working to commercialize an ultra high-speed fluorescence microscopy technology for the drug discovery and oncology diagnostics

Oklahoma Alpha

Christine M. Greve, '17, has been selected to receive an Astronaut Foundation Scholarship. She is a senior at the University of Oklahoma majoring in aerospace engineering with a Spanish minor. The foundation was created by the Mercury 7 astronauts and their families to provide merit-based scholarships to university students who excel in STEM.



astronauts and their families to provide merit-based scholarships to university students who excel in STEM.

Pennsylvania Theta

Albert J. Capuzzi, P.E., '91, is the creator of Dlo Geri, a nonprofit founded to provide safe and clean water to the people of Haiti, and a wastewater engineering leader with Jacobs Engineering. He recently led the founding members of Dlo Geri on a trip to northern Haiti to assess how to best design a clean water project for the New Hope Hospital site.



founded to provide safe and clean water to the people of Haiti, and a wastewater engineering leader with Jacobs Engineering. He recently led the founding members of Dlo Geri on a trip to northern Haiti to assess how to best design a clean water project for the New Hope Hospital site.

Puerto Rico Alpha

Jose A. "Tony" Buitrago, P.E., '77, has joined Dewberry in Jacksonville, FL, as a senior associate and senior project manager. He has more than 35 years experience as a program management professional. Buitrago served for 23 years as an active-duty combat engineer, completing



served for 23 years as an active-duty combat engineer, completing

multiple tours with the U.S. Army Corps of Engineers. He has also led program management teams for the Department of Defense.

Tennessee Alpha

Matthew R. Bessom, M.D., '03, has joined Summit Medical Group in Knoxville, TN, as an internal medicine physician. He was previously an internal medicine hospitalist at the Greenville Health System in South Carolina. Bessom earned his medical degree from East Tennessee State University and completed his internship and residency at University of South Carolina School of Medicine.



earned his medical degree from East Tennessee State University and completed his internship and residency at University of South Carolina School of Medicine.

Robert T. Burns, Ph.D., P.E., '95, associate dean at University of Tennessee Extension, has been named as a fellow of the American Society of Agricultural and Biological Engineers. He was honored for contributions to environmental stewardship of animal production worldwide as an administrator, researcher, and extension engineer and for 22 years of service to ASABE. An authority on manure and nutrient management, he helped to develop a USDA curriculum for animal feeding.

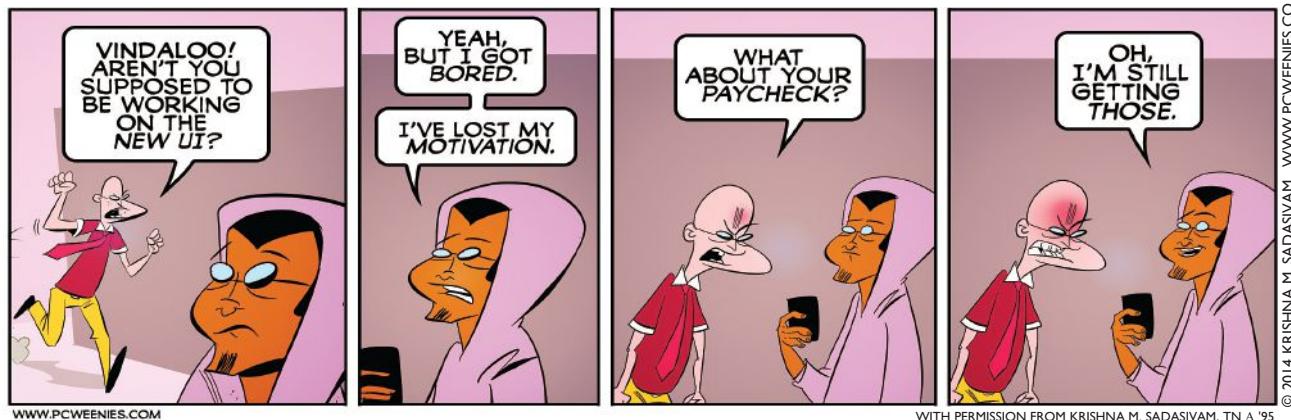


to environmental stewardship of animal production worldwide as an administrator, researcher, and extension engineer and for 22 years of service to ASABE. An authority on manure and nutrient management, he helped to develop a USDA curriculum for animal feeding.

Write Your Own Note!

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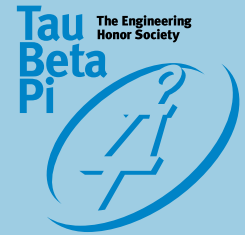
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ABOARD SPACE SHUTTLE COLUMBIA, STS-109 Mission Commander Capt. Scott D. Altman, USN, IL A '81, helps Mission Specialist Michael J. Massimino, Ph.D., NY A '84, with suit-donning prior to Mike's spacewalk during the Hubble Space Telescope's fourth servicing mission. Astronauts Massimino and James H. Newman went on to install the new Advanced Camera for Surveys (ACS) on Hubble. Some 70 Tau Bates have worked together as astronauts since the inception of the space program, and many more have served in the space agency and contractor teams that trained the astronauts, built their unique tools, put them into orbit, kept them there, and brought them safely home. (Photo: NASA)

Tau Beta Pi's Engineering Futures Program teaches students the special skills needed to create and run such effective teams, like resolving interpersonal problems, conducting effective meetings, and presenting results to stakeholders. Your chapter can schedule an Engineering Futures session by visiting www.tbp.org/ef.

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