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TCU Math Newsletter

If I feel unhappy, I do mathematics to become happy. If I am happy, I do mathematics to keep happy.

- Paul Turán

Dr. Susan Staples Wins First Annual SGA Faculty Member of the Year Award

The TCU Student Government Association (SGA) established a new annual award to recognize and demonstrate their appreciation for exceptional faculty members who have made a difference in their academic experience. Dr. Susan Staples of the Mathematics Department was named the winner of the first annual award. Congratulations Dr. Staples!

Dr. Susan Staples

Calculus Bee on Wednesday, April 13

The annual TCU Mathematics Department Calculus Bee will be held on Wednesday, April 13 at 7:00 pm in TUC 243 . The material covered is Calculus I and II, but not beyond the material that current Calculus II students have had. All TCU undergraduates are eligible to compete. TCU bookstore gift cards will be awarded to the top three finishers, with $100 for first place, $75 for second place, and $50 for third place.

TCU Math Major on Winning Team in the JPMorgan Chase Competition

Lillie Johnston, a TCU sophomore mathematics major, was on the winning team of the 2022 Innovate for Impact Case Study Competition sponsored by JPMorgan Chase. The final round was held in Plano, Texas on April 1, 2022. In the competition, teams from around the country competed to solve a posed business case.

Math Majors Honored

Khoi Nguyen has been named the 2022 TCU Mathematics Department Senior Scholar. The winner of the award is determined by a vote of the Mathematics Department Faculty.

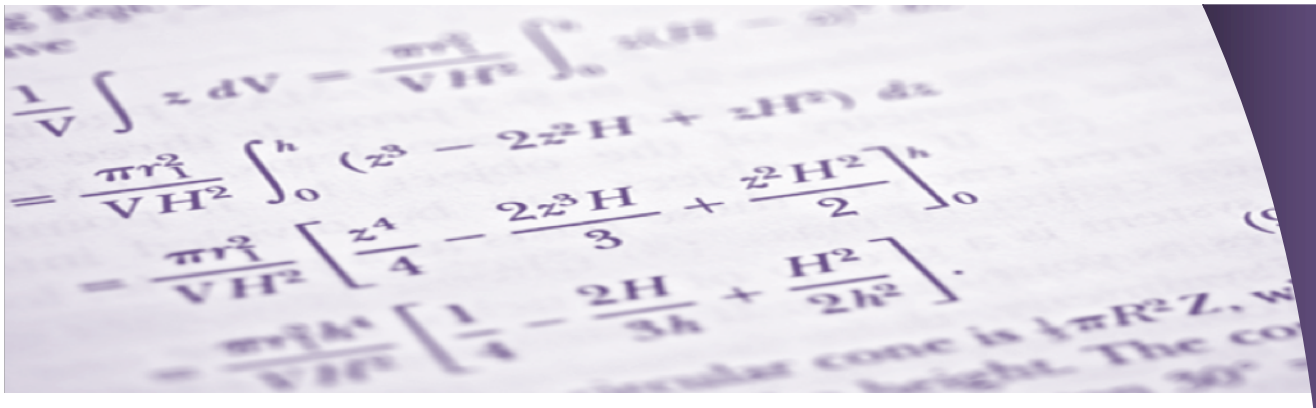
TCU students Alberto Gaucin, Anna Long, Brandon Isensee, Catherine Shurtleff, Divyanshi Singhal, Duong Pham, John Brannon, Karsen Hsing, Kenton Dow, Linh Ta, Maithili Bhate, Mikayla Wilson, Nicole Riddle, Ryan Kirschner, Tuyen Vu, and William Shorow will be initiated into the mathematics honor society Pi Mu Epsilon later this month.

April TCU Math Club Meetings

The TCU Math Club will hold two meetings in April 2022. The first will be on Wednesday, April 6 at 7:00 pm in TUC 243, and it will feature a Short Attention Span Seminar which is a series of short talks by several speakers about math or math related topics. The last meeting for the academic year will be a final study meeting on Wednesday, April 20 at 7:00 pm in TUC 353.

TCU Women in Math Event

All TCU women math students are invited to attend a TCU Women in Math gathering on Tuesday, April 12 at 6:30-7:30 pm in TUC 300. Please come to enjoy snacks and have an open discussion with women in the Math Department. This is a great opportunity to get to know the women mathematics faculty.



Solution to the March 2022 Problem of the Month

Problem: When spaces are bounded, there are various theorems about the existence of fixed points for distance-decreasing functions. Prove that the function

$$f(x) = x + \frac{1}{1+e^x}$$

satisfies $|f(x) - f(y)| < |x - y|$ for all distinct $x, y \in \mathbb{R}$ and yet there is no x for which $f(x) = x$.

Solution: Clearly $f(x) > x$, so there is no fixed point. By the mean value theorem, there exists c between x and y such that

$$f(x) - f(y) = f'(c)(x - y) = \left(1 - \frac{e^c}{(1+e^c)^2}\right)(x - y).$$

Observe that

$$0 < \frac{e^c}{(1+e^c)^2} = \frac{e^c}{1+e^c} \cdot \frac{1}{1+e^c} < 1 \cdot 1 = 1.$$

Therefore,

$$|f(x) - f(y)| < |x - y|.$$

The Problem of Month was solved by Duc Toan Nguyen.

April 2022 Problem of the Month

In anticipation of the Calculus Bee on April 13, we have another calculus problem, albeit one much harder than the Bee problems. Evaluate $\lim_{x\to\infty}((x+1)(1+1/x)^x - ex)$.

Students and others are invited to submit solutions to Dr. George Gilbert by e-mail (g.gilbert@tcu.edu) or hard copy (Math Dept. Office or TCU Box 298900). Correct solutions submitted by persons who are not members of the TCU math faculty will be acknowledged in the next issue of the newsletter. Note that a correct solution is an answer and a justification of its correctness. The solution to the problem will be published in the next edition of the newsletter.

Editor: Rhonda Hatcher
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