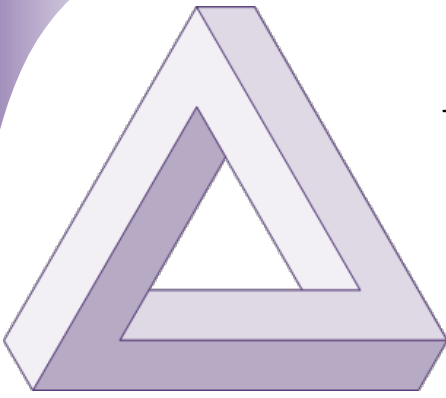


TCU Math Newsletter

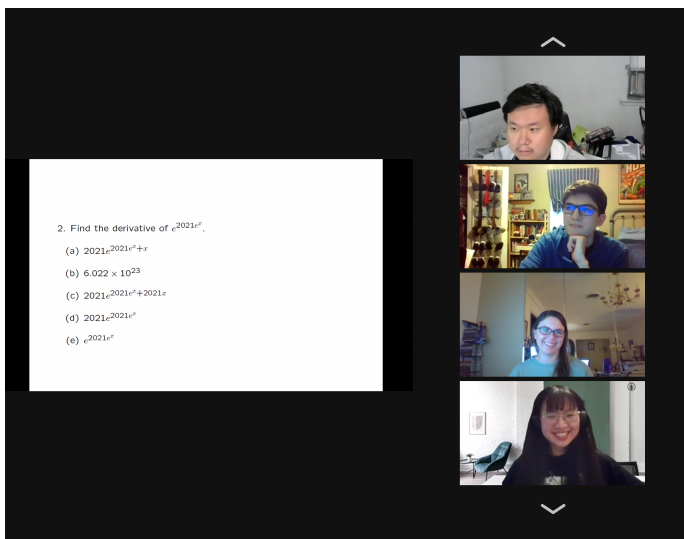


If we have no idea why a statement is true, we can still prove it by induction.

- Gian Carlo Rota

2021 Calculus Bee

The 2021 Calculus Bee was held via Zoom on April 22, 2021. The first-place winner was Sy Neeley. Second place went to Ellena Tran, and third place to Dinh Nguyen. Congratulations to all of the winners!



TCU Math Club

The TCU Math Club is an undergraduate student organization for students interested in mathematics. The Math Clubs focus is on math talks, math challenges, and math fun. The 2021 president is McGilley Simons, K.M.SIMONS@tcu.edu. Contact McGilley, if you want to join.

Gamma Iota Sigma

Gamma Iota Sigma (GIS) is a national academic fraternity for actuarial and risk management. GIS focuses on career talks, internship fairs, philanthropy, and learning about the field of risk management. The 2021 president is Michelle Hearn, M.HEARN@tcu.edu. Contact Michelle, if you are interested in GIS.

Denisa Gyorfi wins Award

In the Spring 2021 semester, senior TCU mathematics major and former TCU Math Club President Denisa Gyorfi was honored with an award recognizing her outstanding contributions to student engagement in the TCU Mathematics Department.

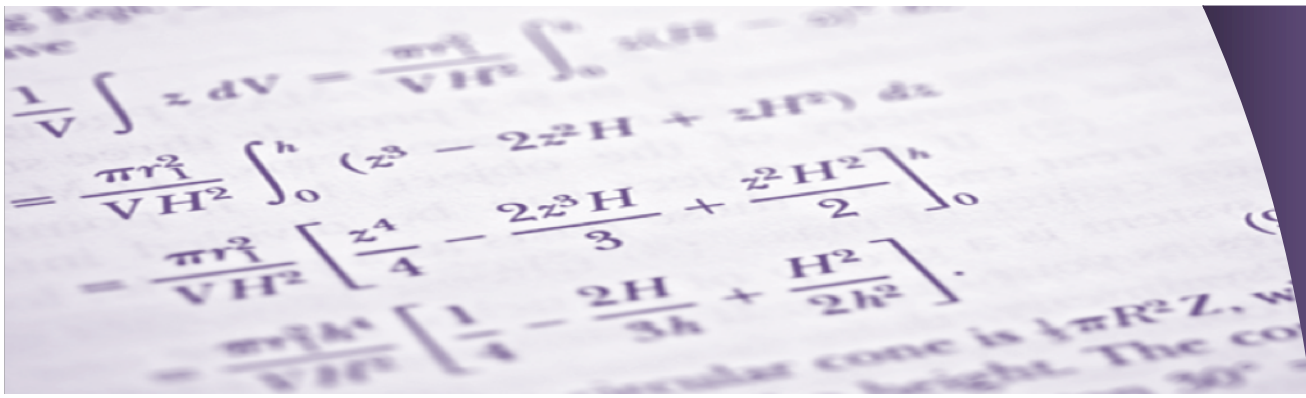


Dr. Emily Herzog (left) and Denisa Gyorfi (right)

TCU Math Clinic

The TCU Math Clinic offers free drop-in tutoring for undergraduates taking math classes. The Math Clinic for Fall 2021 will be in person in TUC 240, or via Zoom. The Math Clinic hours, tutors, and Zoom link can be found at

<https://cse.tcu.edu/mathematics/undergraduate/tcu-math-clinic.php>



Solution to the April 2021 Problem of the Month

Problem: What is the expected number of rolls of a fair die until all six faces have been rolled at least once?

Solution: The expected number of rolls is 14.7. More generally, we find the expected number of rolls for a fair n -sided die. Let $E(j)$ be the expected number of rolls until a given j faces of a fair n -sided die are rolled. We want to find $E(n)$. We get a recursion depending on whether the first roll is or is not one of the j faces. With the convention $E(0) = 0$, we find

$$E(j) = 1 + \frac{j}{n} E(j-1) + \frac{n-j}{n} E(j) \text{ or } E(j) = \frac{n}{j} + E(j-1).$$

In particular, $E(n) = n \sum_{k=1}^n 1/k$. Setting $n = 6$ yields the answer.

One can instead view the problem as a sum of six geometric distributions with probabilities of success $1, 5/6, 4/6, 3/6, 2/6$, and $1/6$. The mean of a geometric distribution with probability of success p is $1/p$.

The Problem of Month was solved by Brad Beadle ('96).

September 2021 Problem of the Month

Let n be a positive integer. Prove that $\sin nx / \sin x \leq n$ whenever it is defined.

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.