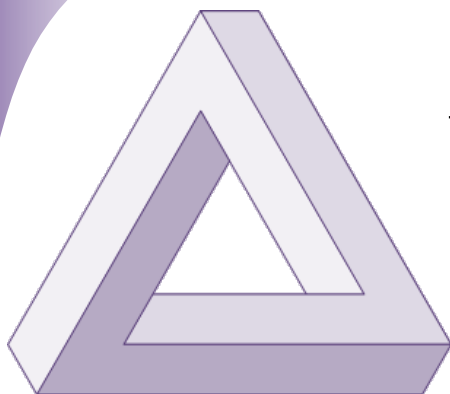# TCU Math Newsletter

To my mathematical brain, the numbers alone make thinking about aliens perfectly rational. The real challenge is to work out what aliens might actually be like.

- Stephen Hawking

Pi Day

Pi Day, a holiday commemorating π, is celebrated on March 14 because in month/date format 3/14 matches the first digits of π. To learn more about Pi Day and pi, see the web site http://www.piday.org.
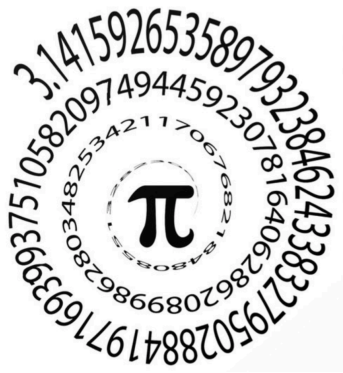
Budapest Semesters in Mathematics Education

Budapest Semesters in Mathematics Education (BSME) is a study abroad program in Budapest, Hungary intended for students interested in the teaching of mathematics at the secondary school level. At BSME, students learn about the Hungarian approach which emphasizes problem solving, mathematical creativity, and communication. The courses are designed so that credits will be transferable to American colleges and universities. BSME is currently accepting applications for Summer 2020 (due April 1), Fall 2020 (due June 1), and Spring 2021 (due November 1). The applications are reviewed on a rolling basis, so students are encouraged to apply early. More information, including the online application, can be found at https://bsmeducation.com.

100th Annual Meeting of the Texas Section of the MAA on March 26-28

The Texas Section of the MAA (Mathematical Association of America) will hold its 100th Annual Meeting at the University of North Texas in Denton, Texas on March 26-28, 2020. The meeting will have events and activities for both undergraduate and graduate students as well as faculty.

The meeting will feature many excellent speakers including: Keith Devlin, Colin Adams, Deanna Haunsperger, Charles Hadlock, Mark Tomforde, and John Quintanilla. In addition, there will be a Math Bowl on the evening of March 26, and student/faculty break-out sessions and an evening banquet on March 27.

More information about the meeting and a link to register for it can be found at: https://maa.unt.edu/program-overview-and-keynote-speakers?cta=hero.

Planned Course Information Available on TCU Mathematics Department Web Site

When registering for mathematics classes, it is helpful to take a look at the planned mathematics course offerings for Fall 2020 through Spring 2023. They are posted on the Mathematics Department web site at https://mathematics.tcu.edu/wp-content/uploads/2020/03/Schedule4yr-S20-web.pdf
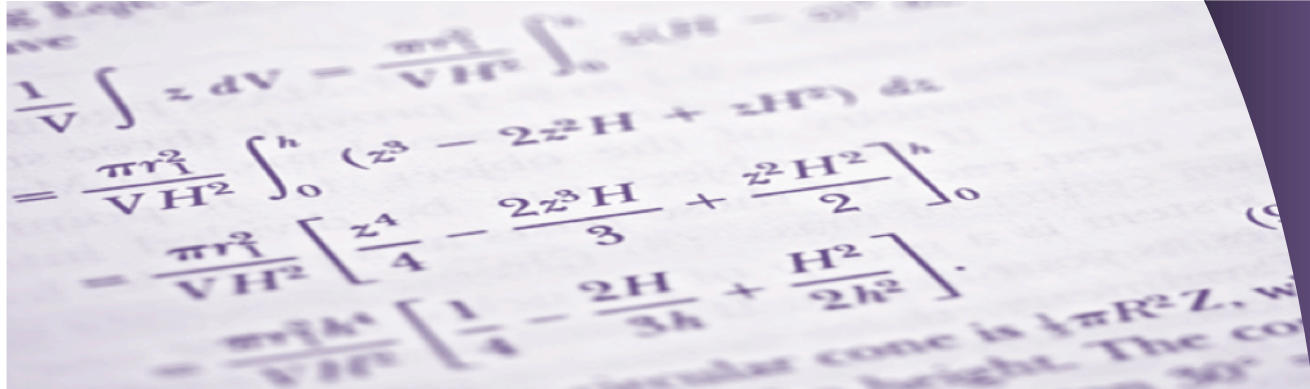
Solution to the February 2020 Problem of the Month

Problem: A wheel of radius 1 rolls straight down a $45°$ ramp until it first touches the horizontal surface. If it completes exactly one revolution, how far up the ramp was the point of initial contact?

Solution: The point was $2\pi + \sqrt{2} - 1$ up the ramp. When the wheel first touches the horizontal surface, the radii to the points of tangent are perpendicular to the ramp and to the horizontal surface. Because the angle of a quadrilateral sum to $360°$, the radii form a $135°$ angle which is bisected by the segment from the center of the wheel to the bottom of the ramp. Thus the distance from the points of contact to the bottom of the ramp is $\tan 22.5°$. From, say, the double angle formula for tangent or the half angle formulas for sine and cosine, we find $\tan 22.5° = \sqrt{2} - 1$. The point of tangency has traveled the circumference of the wheel or 2π. We add these to get our final answer.

This month's problem was solved by TCU student Hoang Long Nguyen and by the SUNY Fredonia Math Club.

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March 2020 Problem of the Month

This month's problem is due to Professor Efton Park. Define a sequence (a_n) to be rapidly decreasing if $\sum_{n=1}^{\infty} n^k a_n$ converges for every positive integer k. Is it true that every rearrangement of a rapidly decreasing sequence is rapidly decreasing?

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.