

TCU Math Newsletter

Since the mathematicians have invaded the theory of relativity, I do not understand it myself any more.

- Albert Einstein

Applications for 2018-2019 SERC Undergraduate Research Grants Due March 30

The TCU Science and Engineering Research Center (SERC) will be awarding research grants for the 2018-2019 academic year to undergraduate students engaged in research with faculty in the TCU College of Science and Engineering. The grants will range from \$500 to \$1500 depending on the needs of the proposed research project. Student applicants must have junior or senior standing with anticipated graduation in May 2019 or later, although exceptions can be made for highly qualified sophomores with the recommendation of a faculty mentor.

The application form for the SERC undergraduate research grants and additional information is available on the SERC web site www.serc.tcu.edu. Students interested in applying should contact a faculty member in the college to see if he or she would serve as a faculty mentor, and be sure to apply by the March 30, 2018 at 4:00 pm deadline.

TCU Career and Intern Expo on February 8

All TCU students and alumni are invited to attend the TCU Career and Intern Expo on Wednesday, February 7, 2018 from 4:00 to 7:00 pm in the Campus Rec Center. Top employers hiring for internships and full time positions in a wide range of industries will be at the Expo.

Those wishing to attend need to register at the website careers.tcu.edu.

2018 TCU Student Research Symposium (SRS) Workshops and Abstract Deadline

TCU undergraduate and graduate students are invited to display their research at the Student Research Symposium (SRS). Any science, engineering, or mathematics student involved in research is encouraged to give a poster presentation at this event. Students wishing to do a poster presentation at SRS must submit an electronic abstract by Friday, March 2, 2018. The poster electronic submission deadline is April 2. There will be workshops on how to make and print the posters on February 9, 16, and 23.

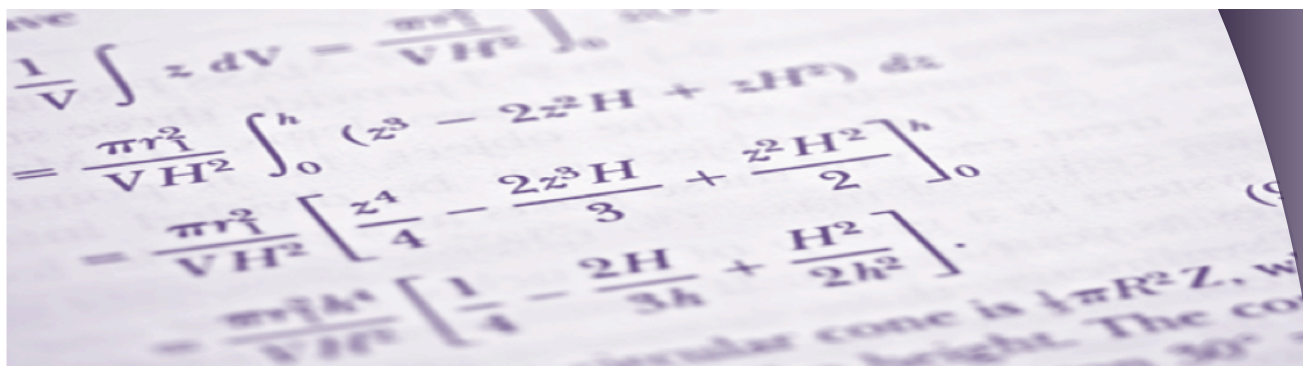
More information about SRS can be found at <http://www.srs.tcu.edu>.

NSF Research Experience for Undergraduates Summer Programs

The National Science Foundation (NSF) funds summer research opportunities for mathematics undergraduate students through 57 REU Sites across the country. Students are granted stipends and, in most cases, housing and a travel allowance.

A list of REU sites in the Mathematical Sciences where you can find details about the individual programs and the application processes can be found at

http://www.nsf.gov/crssprgm/reu/list_result.jsp?unitid=5044



Solution to the November 2017 Problem of the Month

Problem: One learns in Calculus II that

$$1 - \frac{1}{2} + \frac{1}{3} - \frac{1}{4} + \frac{1}{5} - \frac{1}{6} + \frac{1}{7} - \frac{1}{8} + \dots = \ln 2.$$

What is the value of the rearrangement

$$1 + \frac{1}{3} - \frac{1}{2} + \frac{1}{5} + \frac{1}{7} - \frac{1}{4} + \frac{1}{9} + \frac{1}{11} - \frac{1}{6} + \frac{1}{13} + \frac{1}{15} - \frac{1}{8} + \dots?$$

Solution: Partition the terms of the series into blocks of 3, where the k th block has the form

$$\begin{aligned} \frac{1}{4k-3} + \frac{1}{4k-1} - \frac{1}{2k} &= \left(\frac{1}{4k-3} - \frac{1}{4k-2} + \frac{1}{4k-1} - \frac{1}{4k} \right) + \left(\frac{1}{4k-2} - \frac{1}{4k} \right) \\ &= \left(\frac{1}{4k-3} - \frac{1}{4k-2} + \frac{1}{4k-1} - \frac{1}{4k} \right) + \frac{1}{2} \left(\frac{1}{2k-1} - \frac{1}{2k} \right). \end{aligned}$$

Summing over k , we see that the value of the original series is

$$\ln 2 + \frac{1}{2} \ln 2 = \frac{3}{2} \ln 2.$$

This month's problem was solved by Brad Beadle ('96); Qi An; Roger and Peter Bevan; and Chance Moore, Roberto Gonzalez, and Michael Khaimraj.

February 2018 Problem of the Month

Let n be an integer greater than 1 and let x_1, x_2, \dots, x_n be positive numbers. Prove that

$$\sum_{1 \leq i < j \leq n} \frac{1}{x_i + x_j} \leq \frac{n-1}{4} \sum_{1 \leq i \leq n} \frac{1}{x_i}.$$

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.