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TCU Math Newsletter

It is an unending source of surprise for me that a few mathematical scribbles on a piece of paper can change the course of human affairs.

Stanislaw Ulam

TCU Math Club Meetings in March

The TCU Math Club will hold two Zoom meetings in March. The first will feature Dr. Derek Tomlin leading "A First Discussion on Chess." The meeting will include taking about chess notation and some irregular moves, discussing some basic ideas about opening theory, practicing some tactics with interactive chess puzzles, and possibly playing some chess. This meeting will be on Wednesday, March 3 at 6:30-7:30 pm.

The second meeting will feature a talk presented by Professor Allison Owen entitled "Bones, Role Models, and Buried Treasure: Some Nuggets of Black Mathematical History." Long before mathematics was used to solve problems of taxes, astronomy, or architecture, mathematical observations were recorded in Sub-Saharan Africa. From that time on, Black individuals have contributed to the development of mathematics in both theory and practice. A few of those individuals will be highlighted at this meeting, which will be on Wednesday, March 17 at 6:30-7:30 pm.

Both meetings will be via Zoom at the link https://tcu.zoom.us/j/91368610847.
All students interested in attending the meetings are welcome!

Putnam Competition Questions and Solutions

The questions and solutions for the 81st William Lowell Putnam Mathematical Competition are now posted at https://kskedlaya.org/putnam-archive/. Because of limitations due to COVID, the competition this year was unofficial. It is very likely that the competition next year will be official as usual.

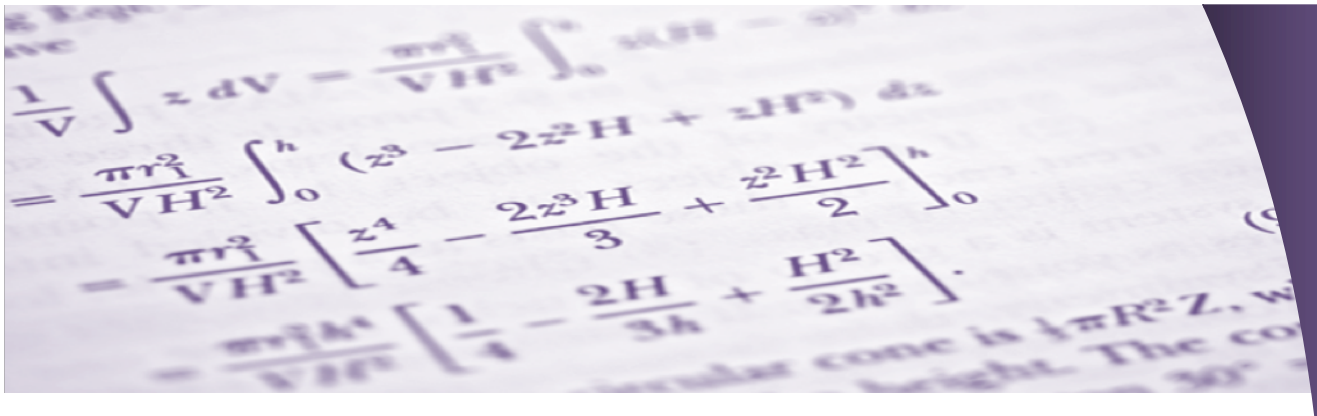
Volunteer Math Tutors Needed to Help Children Impacted by School Closures

Mastery Learning Hour is a nonprofit project which provides free math tutoring to K-12th grade children via Zoom. There are currently hundreds of families on their waiting list, and they are urgently seeking more student volunteers who can donate an hour a week of their time to help meet the needs of children who are struggling to learn during the pandemic.

More information about the program and a link to sign up to be a volunteer tutor can be found at https://www.masteryhour.org/.

SERC Undergraduate and Graduate Research Grant Applications Due April 16

The TCU Science and Engineering Research Center (SERC) is now accepting applications for the Fall 2021 round of SERC Undergraduate and Graduate Research Grants. The grants are used for funding research projects. The application form and more information about the grants are available at www.serc.tcu.edu. The application submission deadline is Friday, April 16, 2021 at 4:00 pm for a funding period of between June 1, 2021 and April 30, 2022.



Solution to the February 2021 Problem of the Month

Problem: (due to Peter Winkler) Find all 10-digit numbers $d_1d_2d_3d_4d_5d_6d_7d_8d_9d_{10}$ with each of 0, 1, ..., 9 appearing exactly once and such that $d_1 \cdots d_i$ is divisible by i for every i.

Solution: The only such number is 3816547290.

To have $d_1d_2d_3d_4d_5d_6d_7d_8d_9d_{10}$ divisible by 10 requires $d_{10} = 0$. To have $d_1d_2d_3d_4d_5$ divisible by 5 now requires $d_5 = 5$.

We must have all d_{2i} even and hence d_{2i-1} odd. A number is divisible by 8 if and only if its last three digits form a number divisible by 8. Thus, d_7d_8 must be one of 16, 32, 72, 96. A number is divisible by 4 if and only if its last two digits form a number divisible by 4. Thus, d_4 is 2 or 6, leaving 4 and 8 for d_2 and d_6.

A number is divisible by 3 if and only if the sum of its digits is divisible by 3. Thus,
$d_1 + d_2 + d_3$, $d_1 + d_2 + d_3 + d_4 + d_5 + d_6$, and
$d_1 + d_2 + d_3 + d_4 + d_5 + d_6 + d_7 + d_8 + d_9$ are all divisible by 3, as are
$d_4 + d_5 + d_6$ and $d_7 + d_8 + d_9$. Thus, when $d_4 = 2$, $d_6 = 8$. Because $d_7d_8 = 16$ implies $d_9 = 8$ also, we have $d_7d_8d_9 = 963$. Neither of the two possibilities, 1472589630 and 7412589630, has its first seven digits divisible by 7. Applying the same reasoning, the remaining cases have the form $d_1 8 d_3 6543210$, $d_1 8 d_3 6543270$, or $d_1 8 d_3 6547230$. Of the six possibilities, only 3816547290 has its first 7 digits divisible by 7. Its first nine digits are divisible by 9 (as is every permutation of 1, ..., 9).

March 2021 Problem of the Month

This month's problem is due to long-time Problem of the Month solver Brad Beadle ('96). Show that it is possible to estimate the smallest angle of a triangle drawn on a piece of paper to within 1 degree using a ruler and a simple calculator, under the constraint that each of the basic operators +,-,*,/ is used at most once. No additional marks are allowed on the paper, and you may assume that measurements with the ruler are exact.

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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