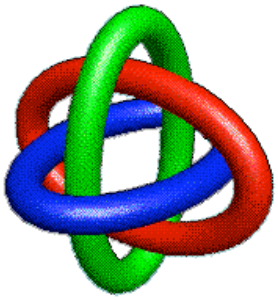
TCU MATH NEWSLETTER



April 2010
Volume 18, Number 6

The beginner should not be discouraged if he finds out that he does not have the prerequisites for reading the prerequisites.

- Paul R. Halmos

TCU Calculus Bee on April 23

The annual TCU Mathematics Department Calculus Bee will be held on Friday, April 23 at 3:30 p.m. in Tucker Technology Center 244. Refreshments for the contestants will be served at 3:00 p.m. in TTC 300.

All TCU undergraduates are eligible to compete. Prizes will be awarded to the top three finishers, with $75 for first place, $50 for second place, and $25 for third place.

Students wishing to compete in the Calculus Bee should sign up in the Mathematics Department office in TTC 206. While there is no deadline for signing up, we would like to know who is participating as soon as possible.

Frank Stones Mathematics Research Lectureship

Professor Ronny Hadani of the University of Texas at Austin will present the next talk in the Frank Stones Mathematics Research Lectureship. He will present the talk ***Representation theoretic patterns in three dimensional cryo-electron microscopy*** at 4:00 pm on Wednesday, April 7 in Tucker Technology Center 246.

All TCU students and faculty and other interested members of the community are invited to come to the talk. Refreshments will be served before the talk in TTC 300.

Duy Nguyen's Recital on April 27

Duy Nguyen will have his senior piano recital at 5:00 p.m. on Tuesday, April 27 in PepsiCo Recital Hall. He would love for his professors and fellow students to attend. The recital is free and open to the public.

Four Mathematics Majors Honored with Phi Beta Kappa Invitations

Four TCU mathematics majors were invited to join the prestigious national honor society Phi Beta Kappa. Micki Cunyus, Rachel Lamb, Duy Nguyen, and Sneha Popley were honored and will be initiated into membership in May 2010.

Duy Nguyen Named Mathematics Senior Scholar

Duy Nguyen was selected as the 2010 Mathematics Department Senior Scholar. The winner of this award is selected by the Mathematics Department Faculty. The award will be presented to Duy at the TCU Honors Banquet on April 15.

TCU Student Research Symposium on April 16

The fifth annual TCU Student Research Symposium will be held in the Tucker Technology Center on Friday, April 16. In the symposium, students from the TCU College of Science and Engineering present their research in poster displays throughout the building. The symposium will also include a keynote speaker, Jonathan Shapiro, the CEO and founder of the Texas Institute for Sustainable Technology Research. The keynote address ***Sustainable Technology, Trends and Career Opportunities*** will be at 4:15 p.m. in Sid W. Richardson Lecture Hall 1.

The TCU Math Newsletter is published each month during the academic year.

Editor:
Rhonda Hatcher

Problem Editor:
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Thought of the Month Editor:
Robert Doran

Solution to the March 2010 Problem of the Month

Problem: A two-dimensional disk of radius 1 rolls down a line making acute angle θ with the positive x-axis. Consider a point on the disk a distance r from the center of the disk. For what r will both the x- and y-coordinates of this point always decrease as the disk rolls?

Solution: We may set up our coordinate system so that the center of the disk begins at the origin and the point at $(r, 0)$. When the center of the circle has moved a distance t down the line, it has also rotated counterclockwise by t. Thus, the position of the point is

$$(x, y) = (- t \cos \theta + r \cos t, - t \sin \theta + r \sin t).$$

Then

$$(x', y') = (- \cos \theta - r \sin t, - \sin \theta + r \cos t).$$

It follows that we need $- \cos \theta - r \sin t \le 0$ and $- \sin \theta + r \cos t \le 0$ for all t. The two derivatives are maximized when $\sin t = -1$ and $\cos t = 1$, respectively, so that we obtain the condition r &le $\max\{\cos \theta, \sin \theta\}$.

April 2010 Problem of the Month

In honor of the 26th annual Calculus Bee, this month's problem is an integration problem (though it's harder than Calculus Bee problems). Let $a < b < c$ be the real roots of a real cubic polynomial $p(x)$. Show that the area between $y = p(x)$ and the x-axis over $[a, b]$ is less than that over $[b, c]$ if and only if $b-a < c-b$.

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.