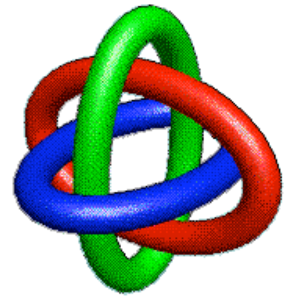
TCU MATH NEWSLETTER



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One of the endearing things about mathematicians is the extent to which they will go to avoid any real work.

--- Matthew Pordage

TCU Calculus Bee on Tuesday, April 8

The annual TCU Mathematics Department Calculus Bee will be held on Tuesday, April 8 at 4:00 p.m. in Tucker Technology Center 244. Refreshments for the contestants will be served at 3:30 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

TCU Student Research Symposium Call for Abstracts

The TCU Student Research Symposium (SRS) will be held on Friday, April 18, 2008. The SRS will showcase student research from the College of Science and Engineering and offer a relaxed forum in which students can present their work in a poster presentation. Any undergraduate or graduate student who has been engaged in some form of research is strongly encouraged to participate. The deadline for abstract submissions and electronic posters is Friday, March 28.

For more information about SRS and to submit an abstract, visit the SRS website www.srs.tcu.edu.

Problems and Solutions

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

Editor:
Rhonda Hatcher

Problem Editor:

Solution to the February 2008 Problem of the Month

Problem: Show that there is no (everywhere) increasing cubic polynomial passing through the points (0,0), (1,1), and (2,16).

Solution: Because the cubic passes through (0,0), it has the form $y = ax^3 + bx^2 + cx$. Passing through (1,1) and (2,16) implies

$$a + b + c = 1,$$
$$8a + 4b + 2c = 16.$$

Solving for b and c in terms of a, we see that

$$y = ax^3 + (7\text{-}3a)x^2 + (2a\text{-}6)x.$$

For the cubic to be increasing, we must have

$$y' = 3ax^2 + (14\text{-}6a)x + (2a\text{-}6) \geq 0$$

for all x. For this to hold, y' cannot have two distinct real roots. This will be true if and only if its discriminant is not positive, i.e.

$$0 \geq (14\text{-}6a)^2 - 4(3a)(2a\text{-}6) = 12a^2 - 96a + 196 = 12(a\text{-}4)^2 + 4,$$

George Gilbert

Thought of the Month Editor:
Robert Doran

which does not hold for any a.

The February Problem of the Month was solved by undergraduates Eric Gonzalez, John LaGrone, and Darren Ong, and by graduate student Randell Simpson.

March 2008 Problem of the Month

This month's problem is a reworded version of a problem due to Bill Sands. A 3-by-3 matrix has nonnegative real entries and columns summing to 2. Show that one can always choose 3 entries, with one entry from each row and one entry from each column, whose sum is between 1 and 3, inclusive.

Darren Ong continues to offer his challenge. If any TCU student (undergraduate or graduate) submits a correct solution to the Problem of the Month before he does, Darren will dye his "hair bubble-gum pink for at least a week."

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.