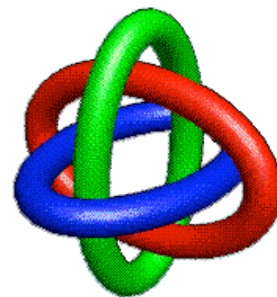


TCU MATH NEWSLETTER



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September 2008
Volume 17, Number 1

The universe is an enormous direct product of representations of symmetry groups.

--- Steven Weinberg (1979 Nobel Prize Winner)

Putnam Mathematics Contest

The Sixty-Ninth Annual [William Lowell Putnam Mathematical Competition](#) will be held on Saturday, December 6, 2008, from 9:00 a.m. to noon and 2:00 to 5:00 p.m. The [questions](#) require different levels of mathematical background, and all require a bit of ingenuity to solve. The scores on the exam are typically quite low, and even answering a couple of questions is considered an excellent performance. The competition is open to undergraduates enrolled in colleges and universities of the United States and Canada who have not yet received a college degree. Those interested in signing up to take the Putnam exam this year should contact Professor George Gilbert at g.gilbert@tcu.edu. You might also consider attending some of the meetings of Professor Gilbert's problem solving course (Math 60023). The course is modular and geared towards contest problems, so irregular attendance is perfectly acceptable.

Mathematics Majors Initiated into Pi Mu Epsilon

Last spring, undergraduates Liron Bainglass, Keith Hayton, Ashley Larson, Darren Ong, and Anna Wilhelm were inducted into [Pi Mu Epsilon](#), the national honor society in mathematics. Congratulations!

Parabola Meetings on September 3 and 17

The first meeting of Parabola, the TCU undergraduate mathematics student organization, will be on Wednesday, September 3 at 4:00 p.m. in TTC 138. The meeting will feature a talk by Professor Martin Edwards of Oxford University. His talk is entitled ***My Life as a Mathematician at Oxford and Interesting Mathematical Characters I Have Met***. The second meeting of Parabola will be on Wednesday, September 17 at 4:00 p.m. in TTC 138. The speaker for the second meeting will be TCU undergraduate mathematics major Darren Ong. Darren's talk is entitled ***Counting with Fractions - A Solution to the McNugget Problem***. Refreshments will be served before both of the talks in TTC 300 at 3:30 p.m.

Students interested in joining Parabola should come to one of the meetings or contact Professor Ken Richardson at k.richardson@tcu.edu.

Problems and Solutions

Solution to the April 2008 Problem of the Month

Problem: Find all values of b for which the parabola $y = x^2 + b$ is tangent to the unit circle.

Solution: The parabola has slope $dy/dx = 2x$. Implicitly differentiating, the unit circle, $x^2 + y^2 = 1$, has slope $dy/dx = -x/y$. These two derivatives are equal at a point of tangency, so either $x = 0$ or $y = -1/2$. In the first case, $y = \pm 1$ and $b = \pm 1$, respectively. In

published each month during the academic year.

Editor:
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Problem Editor:
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Thought of the Month Editor:
Robert Doran

the second case, $x = \pm \sqrt{3}/2$ and $b = -5/4$.

The April Problem of the Month was solved by undergraduates Thanh Huynh, John LaGrone, and Darren Ong, and by graduate student Randell Simpson.

September 2008 Problem of the Month

Our first problem of the month is due to Elgin Johnston. Let

$$p(x) = x^7 - 3x^6 - 8x^5 - 5x^4 - 7x^3 - 17x^2 - x - 4.$$

Prove that $p(x)$ has exactly one positive root r and that any other real or complex root s satisfies $|s| < r$.

This year begins with Darren Ong continuing to offer a 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.