TCU Math Newsletter

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My work always tried to unite the true with the beautiful;
but when I had to choose one or the other, I usually chose the beautiful.
– Hermann Weyl (1885-1955)

Three Research Lectureship Talks Scheduled for October

Professor Edward Dunne of Oklahoma State University will present two TCU Research Lectureship talks during his visit to our campus. The first talk is entitled "Solving Some Differential Equations by Using Everything You Know," and will be given at 4 p.m. on Monday, October 11. He will present a second talk, "Building Conformal Manifolds out of Twisters," on the following day, Tuesday, October 12.

Our second Research Lectureship speaker for October is Professor Marilyn Breen of the University of Oklahoma. She will present the talk "Staircase Kernels for Orthogonally Starshaped Polygons" at 4 p.m. on Tuesday, October 19.

All of the Research Lectureship talks are held in Winton Scott Hall 145. Students, faculty, and other members of the community interested in mathematics are invited to attend the lectures and to join us for refreshments at 3:30 p.m. before each talk in Winton Scott Hall 171.

Parabola Talk to be Presented by Professor Ken Richardson

Parabola, the TCU undergraduate mathematics club, will host a talk presented by Professor Ken Richardson. The talk is entitled "Geometry of Curves in the Plane," and will be presented on Tuesday, October 26 at 3:30 p.m. in Winton Scott Hall 145, with refreshments at 3:00 p.m. in Winton Scott Hall 171.

All are invited to attend Parabola talks, and TCU undergraduate math majors are especially encouraged to attend.

Deadline for Undergraduates to Sign Up for the Annual Putnam Mathematical Competition is October 11

The 54th William Lowell Putnam Mathematical Competition, the national undergraduate mathematics contest, will be held this year on December 7. The TCU Mathematics Department will give the exam from 9 a.m. – 12 noon and 2 p.m. – 5 p.m. in Winton Scott Hall. A free pizza lunch will be provided for all contestants.

This competition is open only to regularly enrolled undergraduates of the United States and Canada who have not yet received a college degree. It consists of two sessions of six problems requiring ingenuity but only a modest mathematical background. Last year's exam is posted on the Problem Solving Bulletin Board in Winton Scott Hall. When looking at the exam, please be aware of the fact that answering only a few questions on the Putnam Exam is a very good performance.

Prizes and honors are awarded to the top contestants nationally. In addition to individual honors, the Putnam Competition recognizes the performance of teams from each institution with at least three registered entrants. Last year, the TCU team, consisting of graduating mathematics major seniors Tracy VanDyke and Steve Scott and junior physics major Shawn Gay, did well, placing 94th out of the 284 institutions with teams entered.

Any TCU undergraduates interested in taking the Putnam Exam this year must sign up with Dr. George Gilbert in his office in Winton Scott Hall 141 or by telephone at 921-7335. The deadline for signing up is Monday, October 11, so please contact him soon.

Solution to the September 1993 Problem of the Month

Problem: *On June 23, 1993, Professor Andrew Wiles, of Princeton University, announced that he had proved Fermat's Last Theorem, a problem which had remained unsolved for over 300 years. Dr. Wiles' proof fills 200 pages. The theorem states that for an integer* $n \geq 3$, *the equation*

$$x^n + y^n = z^n$$

has no solution in positive integers x, y, and z. This month's problem, perhaps a bit tougher than usual, but requiring less than one page, is to prove that the equation $x^n + y^n = z^n$ *has no solution in positive integers x, y, and z with* $z \leq n + 1$.

Solution: To solve the limited special case of Fermat's Last Theorem, suppose we have a solution in positive integers x, y, and z. Note that x and y are at most $z - 1$, so we have the inequality

$$2(z-1)^n \geq z^n,$$

or

$$2 \geq \left(\frac{z}{z-1}\right)^n = \left(1 + \frac{1}{z-1}\right)^n \geq \left(1 + \frac{1}{n}\right)^n.$$

For $n \geq 2$, the binomial theorem implies

$$\left(1 + \frac{1}{n}\right)^n > 1 + \binom{n}{1}\frac{1}{n} = 2,$$

a contradiction.

Problem of the Month

In honor of the World Series, this month's problem is a two-part baseball question. The first is an oldy, but goody. The second is due Richard Friedlander and Stan Wagon and appears in the October 1992 issue of Mathematics Magazine. Two batters, Veteran and Youngster, bat against two pitchers, Righty and Lefty. (i) Show that it is possible for Veteran to have a higher batting average than Youngster versus Righty, a higher batting average than Youngster versus Lefty, and yet have a lower combined batting average versus the two pitchers. (ii) Is it possible to have the situation in (i) and simultaneously have Veteran hit for a lower average versus Righty than versus Lefty, Youngster hit for a lower average versus Righty, and the hitters have a lower combined batting average versus Lefty?

Students and others are invited to submit solutions to Dr. George Gilbert (Math Dept. Office or P.O. 32903). 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.

The TCU Math Newsletter will be published each month during the academic year.
Dr. Hatcher: Editor; Dr. Gilbert: Problem Editor; Dr. Doran: Thought of the Month Editor.
Items which you would like to have included should be sent to Dr. Hatcher (Math Dept. Office or P.O. 32903).