TCU Math News Letter

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A man is like a fraction whose numerator is what he is and whose denominator is what he thinks he is. The larger the denominator the smaller the fraction.

-- L. N. Tolstoy

Editor: Dr. Rhonda Hatcher and Archive of Newsletters

TCU Research Lectureship Series

The Frank Stones TCU Research Lectureship Series for the 2007-2008 academic year will begin on Tuesday, September 25 with a talk by Professor David Jorgensen of the University of Texas at Arlington. He will present the talk "From smooth to shellable: a survey of commutative noetherian rings" in TTC 245 at 4:00 p.m.

All students, faculty, and interested members of the community are invited to attend the Lectureship Series talks. Refreshments will be served before the talks in TTC-300 at 3:30 p.m.

Sporadic Undergraduate Mathematics Seminar (SUMS)

Undergraduates Chris Huff, John LaGrone, Darren Ong, Chris Terrell, and Anna Wilhelm plan to meet at 1 p.m. on five or six Fridays throughout the semester in an informal seminar under the guidance of Professor George Gilbert. This fall's topic is voting methods. The group will analyze various properties of voting methods, culminating in a proof of a version of Arrow's Impossibility Theorem and related results. Kenneth Arrow was co-recipient of the 1972 Nobel Prize in Economics due in large part to this theorem from the late 1940s. If you would like to participate, please contact Professor George Gilbert at g.gilbert@tcu.edu.

Putnam Mathematics Contest

The Sixty-Eighth Annual William Lowell Putnam Mathematical Competition will be held on Saturday, December 1, 2007, 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.

Solution to the April 2007 Problem of the Month

Problem: A certain set of n integers has the property that the difference between the product of any $n-1$ of them and the remaining one is divisible by n. Prove that the sum of the squares of all n integers is divisible by n. (Due to Jerry Heuer.)

Solution: Let $P = a_1 a_2 \cdots a_n$. The given condition is that $\dfrac{P}{a_i} - a_i$ is divisible by n, implying that $a_i\left(\dfrac{P}{a_i} - a_i\right) = P - a_i^2$ is also divisible by n. Then n divides

$$\sum_{i=1}^{n}\left(P - a_i^2\right) = nP - \sum_{i=1}^{n} a_i^2.$$ It follows that n divides the sum of the squares of all n integers.

September 2007 Problem of the Month

Find two points on the parabola $y = x^2$ so that the line segment between them passes through $(0,1)$ and has length $\sqrt{18}$.

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