TCU Math News Letter

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It seems a lot of stuff is attributed to Gauss - either he was really smart or he had a great press agent.

Maybe he just had a magnetic personality.

-- Ronald L. Graham, AT&T Laboratories
Donald E. Knuth, Stanford University
Oren Patashnik, Stanford University

Editor: Dr. Rhonda Hatcher and Archive of Newsletters

First Parabola Meeting On Tuesday, September 9

Parabola, the TCU undergraduate mathematics club, will hold its first meeting on Tuesday, September 9, in Winton Scott Hall 171. The featured speaker will be Richard McGowan, a TCU mathematics major graduate who currently works at Coopers & Lybrand in Dallas. The title of his talk is, "What Will I Do With a Math Degree?" Mr. McGowan has worked as an actuary and as a consultant, and will share his work experiences with us. We will have refreshments beginning at 3:30 p.m. in Winton Scott Hall 171, and then move to room 145 for the talk at 4:00 p.m..

Membership in Parabola is open to all TCU undergraduates, faculty, and other interested members of the community. Dues are just four dollars per year, which we use to help cover the cost of refreshments. If you are interested in joining, please try to attend our first meeting or contact Professor Rhonda Hatcher, the faculty sponsor of Parabola at 921-7335.

The Putnam Exam and the TCU Problem Solving Seminar

The 58th Annual William Lowell Putnam Mathematical Competition will held on Saturday, December 6, 1997. This annual competition consists of a twelve-question written exam. The questions require different amounts 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 few questions is considered a very good 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. Any college or university with at least three entrants also enter the team competition. Prizes are awarded to the top twenty-five finishers and to the departments of mathematics of the institutions with the five top ranking teams. Copies of last years exam are posted on the Problem Solving bulletin board down the hall from the Mathematics Department. Those interested in signing up to take the Putnam Exam this year should contact Professor George Gilbert (in Winton Scott Hall 141 or 921-7335 or g.gilbert@tcu.edu).

Professor Gilbert is running a problem solving seminar this fall on Wednesdays at 2:00-4:30 p.m. in Winton Scott Hall 145. Each week the seminar will have a featured theme which will be posted on the problem solving bulletin board. The emphasis will be on gaining experience with contest-type problems and on writing clear, complete solutions. Both aspects will be of benefit not only in taking the Putnam Exam, but also in upper level mathematics courses. Interested students are invited to attend any of the seminars.

TCU Lectureship Series Begins on Tuesday, September 16

The TCU Mathematics Department Research Lectureship Series for 1997-1998 will feature talks by nine research mathematicians from other universities. The first speaker will be Professor Gary Hamrick of the University of Texas at Austin. His talk, entitled "Three Different Views of the Euler Characteristic: When Algebra, Geometry and Differential Equations are the Same Thing," is at 4:00 p.m. in Winton Scott Hall 145 on Tuesday, September 16, 1997.

Refreshments will be served in Winton Scott Hall 171 during the half-hour preceding each talk. All TCU students, faculty, and other interested members of the community are invited to attend the lectures.

Solution to the April 1997 Problem of the Month

Problem: Raffle tickets for a $500 prize sell for $1. If you are the only person left who may buy tickets and 200 have already been sold to others, how many tickets should you buy in order to have the largest possible average profit?

Solution: Buy 116 tickets.
Let x be the number of tickets we buy and let f(x) be the average profit. Then the probability of winning is $x/(200+x)$, so that

$$f(x) = \frac{x}{200 + x} \cdot 500 - x \cdot 1 = \frac{500x}{200 + x} - x.$$

Differentiating and simplifying, we find

$$f'(x) = \frac{-x^2 - 400x + 600000}{(200 + x)^2}.$$

Using the quadratic formula, we find a single positive critical point, $x = \sqrt{100,000} - 200 \approx 116.227766$. To the left of this point, f '(x)>0 (check f '(0)), while to the right of this point f '(x)<0 (check $\lim_{x \to \infty} f'(x)$). Thus, f(x) increases from 0 to the critical point, then decreases. Since x is restricted to integer values, the maximum average profit must occur when x=116 or x=117. Plugging into f(x), we see that the maximum occurs when x=116.

Problem of the Month

The first row in chess has 8 squares occupied by white pieces. In the middle are the king and queen. Just outside of them are two bishops, flanked by two knights, with two rooks on the two outside squares. In a variant called Fischer Random Chess, named after the famous and eccentric chess player Bobby Fischer, the 8 white pieces are placed on the first row at random, subject to two restrictions: the bishops must be on opposite-colored squares and the king must be somewhere between the two rooks. The black pieces are

then placed to mirror the white set-up, and the pawns are in their normal positions. How many initial positions are possible in Fischer Random Chess? (Be sure to include your derivation, not just the answer.)