TCU Math News Letter

Volume 9, Number 3 November 2000

The laws of nature are but the mathematical thoughts of God.

--- Euclid

Editor: Dr. Rhonda Hatcher and Archive of Newsletters

Parabola Meetings

Professor George Gilbert will give a Parabola talk on Wednesday, November 15, from 3:00 to 4:00 p.m., in Winton Scott Hall 145 entitled "Election 2000: Presidential Election Math." Refreshments will precede the talk at 2:30 in Winton Scott Hall 171. The talk will be aimed at a general audience. It will look at some of the data from the election, with a brief look at the polls and the effect of third party candidates. It will then examine which states gain power because the Electoral College determines the winner rather than the national popular vote.

Parabola will also hold a meeting on Tuesday, November 28 from 3:00 to 5:00 p.m. in Winton Scott Hall 171. The meeting will consist of refreshments and a movie. Watch the Parabola Bulletin board for more details.

Membership in the MAA

Parabola is an official student chapter of The Mathematical Association of America (MAA). As such, we can offer student memberships to the MAA for TCU students at a very discounted cost. The cost for students is only $10 per year plus $10 or $20 for a subscription to one of the MAA journals. All TCU mathematics majors are encouraged to join. For more information and for membership applications, please see Dr. Ken Richardson in WSH 142.

Goldwater Scholarship

Applications are now being accepted for the 2001 Barry M. Goldwater Scholarships. Three hundred Goldwater Scholarships are awarded each year to undergraduates interested in a career in mathematics, the natural sciences, or engineering.

To be eligible, you must be a current full-time sophomore or junior and must be pursuing a baccalaureate degree, have at least a B average, stand in the upper fourth of your class, and be a U.S. citizen, resident alien, or U.S. national. The scholarship covers eligible expenses up to a maximum of $7500 per year.

Over the last two years, three TCU undergraduates have been awarded Goldwater Scholarships.

Students interested in applying should contact Professor Rhonda Hatcher, the TCU Coordinator of

Prestigious Scholarships, (in Winton Scott Hall 142 or at 257-6062 or r.hatcher@tcu.edu). The application deadline is February 1, 2001

Summer Mathematics Program for Women Undergraduates

The Mathematics Departments of Carleton College and Saint Olaf College in Northfield, Minnesota will run a four-week summer mathematics program for talented undergraduate women in mathematics.

The program will be staffed by mathematicians who are active professionals and outstanding teachers. The students in the program take two courses where they are introduced to mathematics beyond calculus that students do not usually have the opportunity to study in a standard undergraduate mathematics program. Other activities include recreational problem solving, colloquia, discussions about careers in mathematics, and organized recreational activities. Participants receive a $1300 stipend, campus room and board, and a travel allowance.

To be eligible for this program, applicants must be female mathematics majors who are finishing their first or second year of undergraduate work, who are enrolled in an American college or university, and who have completed linear algebra but have not completed more than one year of mathematics past linear algebra.

Students interested in applying can find more detailed information and application materials at

http://www.mathcs.carleton.edu/smp/index.html.

The application deadline is February 20, 2001.

Solution to the October 2000 Problem of the Month

Problem: *Players A and B play the following game:*

$$x^3 + \_ x^2 + \_ x + \_$$

Player A begins by writing an integer in any of the blanks; B then plays an integer in one of the remaining blanks; A then fills the last blank with an integer. A wins the game if the resulting polynomial can be factored as $(x-a)(x-b)(x-c)$ for some (not necessarily distinct) integers a, b, c. Which player can guarantee winning? How? (From the Ontario Secondary School Mathematics Bulletin.)

Solution: Player A can guarantee a win. There are only two ways two ensure this. The idea for the first way is to get first 0 and then 1 as roots of the polynomial. Specifically, Player A's first choice should be 0 for the constant term. Thus, the polynomial is $x^3 + \_ x^2 + \_ x = x(x^2 + \_ x + \_)$. Now if Player B chooses c for the coefficient of x^2, then Player A will choose $-c-1$ for the coefficient of x. The polynomial factors as $x(x-1)(x+c+1)$. If Player B chooses c for the coefficient of x, then Player A will choose $-c-1$ for the coefficient of x^2. The polynomial will then factor as $x(x-1)(x-c)$.

The second way for Player A to win is to make sure the polynomial is divisible by $x^2 - 1 = (x+1)(x-1)$, guaranteeing the third root is integral as well. To do this Player A should first choose the coefficient of x to be -1, and then choose the last coefficient to be the opposite of whatever value Player B chooses. Thus the polynomial will end up having the form $x^3 - cx^2 - x + c = (x+1)(x-1)(x-c)$.

The first solution was found by math major Dustin Sitar and the second by graduate student David Puente.

Problem of the Month

Assume that knowing a person is a two-way street. In other words, assume that if Harry knows Sally, then Sally knows Harry. Show that some two people in the world know the same number of other people.