TCU Math News Letter

Volume 14, Number 6 April 2006

I don't believe in natural science.

-- Kurt Gödel (mathematician)

Editor: Dr. Rhonda Hatcher and Archive of Newsletters

TCU Research Lectureship Series

The Frank Stones Lectureship Series will feature a talk by Professor Nicolae Anghel of the University of North Texas on Tuesday, April 11, 2006. Professor Anghel will present the talk " -harmonic Forms on Rotationally Symmetric Spaces" in Tucker Technology Center 246 at 4:00 p.m.

The rotationally symmetric spaces are a natural generalization of the surfaces of revolution. Broad enough to accommodate diversity yet narrow enough to yield definitive results, they form a good test class in Riemannian geometry. In this talk Professor Anghel will consider a classical result of R. Dodziuk regarding the structure of -harmonic forms on rotationally symmetric spaces from the point of view of Dirac operators.

Refreshments will be served before the talk in TTC-300 at 3:30 p.m.

Calculus Bee on April 25

The annual TCU Mathematics Department Calculus Bee will be held on Tuesday, April 25 at 3:30 p.m. in Tucker Technology Center 244. Refreshments for the contestants will be served at 3:00 p.m. in TTC 300.

All TCU undergraduates are eligible to compete. Prizes will be awarded to the top three finishers, with $75 for first place, $50 for second place, and $25 for third place.

Students wishing to compete in the Calculus Bee should sign up in the Mathematics Department office in TTC 206. While there is no deadline for signing up, we would like to know who is participating as soon as possible

Putnam Results

The results from last December's William Lowell Putnam Mathematical Competition have been announced. The contest was taken by 3545 undergraduates in the United States and Canada. TCU students with noteworthy performances were: Darren Ong, who finished in the top ten percent: Joey Spellman, John Rhoads, and Jeff Rhodes, who all finished in the top third. The TCU team of three individuals (Darren, Joey, and John) finished 67th out of 395 colleges and universities fielding teams.

Mathematics Majors Honored

Michael Cestarte and Joey Spellman were named the TCU Mathematics Department Senior Scholars for 2006. They will receive this honor at the TCU Honors Banquet on April 20. Four mathematics majors, Rachel Farris, Bara Gunnarsdottir, Sara Rozzell, Jamie Smith, and Joey Spellman, were recently honored with invitations to become members of Phi Beta Kappa. They will be inducted into membership on May 11.

Solution to the March 2006 Problem of the Month

Problem: Consider a 4-by-4 Sudoku using the numbers $1, 2, 3, 4$. What is the minimum number of squares that need to be given in order to have a unique solution? (Macalester Problem of the Month.)

It takes at least four clues. Clearly, any solvable puzzle must contain at least three of the four numbers or else we couldn't distinguish the omitted numbers. There must be a clue in row 1 or 2 or else we could switch the rows and get a different solution. Similarly there must be clues in row 3 or 4, in column 1 or 2, and in column 3 or 4. We can switch rows 1 and 2 or rows 3 and 4, without changing the nature of the Sudoku. Similarly, we can exchange rows 1 and 2 with 3 and 4. We can also do the same interchanges with columns. Finally, we can permute the numbers $1, 2, 3$, and 4. We can also transpose the Sudoku, interchanging rows and columns. After performing such exchanges, any 3-clue Sudoku may be transformed to one of the following five possibilities:

We leave it to the reader to show that each has at least two solutions. We also leave it to the reader to deduce that the following 4-clue Sudoku has a unique solution:

April 2006 Problem of the Month

For what positive real numbers p is the maximal distance from the point $(1,0)$ to the curve $y = x^p, 0 \leq x \leq 1$, equal to 1?

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.

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. 298900).