

TCU Math Newsletter

Volume 2, Number 1

September 1993

*A chess player may offer the sacrifice of a pawn or even a piece,
but a mathematician the game.*

— G. H. Hardy

September Parabola Meetings

Parabola is the TCU undergraduate mathematics club. All TCU students and faculty interested in mathematics are invited to join. The meetings of Parabola usually consist of a half hour social meeting with refreshments followed by a talk. These talks are at an undergraduate level and offer a nice way of seeing some interesting mathematics and mathematical applications outside of the usual classroom setting. Parabola will sponsor several talks this year.

Our first talk will be presented by Ken Clarke, and is entitled "Tennis Anyone: A Scheduling Problem." Ken is both a mathematician who has taught at TCU and a tennis pro, and it will be interesting to see how mathematics applies to the world of tennis. His talk is scheduled for Thursday, September 2. Refreshments will be served at 3:00 p.m. in WSH 171 and the talk will begin at 3:30 p.m. in WSH 145.

The second meeting of Parabola will feature a talk presented by Dr. Charlie Deeter, a member of the Mathematics Department. His talk is entitled "Perron & Frobenius Encounter Autumn Madness." The talk will be given at 3:30 p.m. on Tuesday, September 21 in WSH 145. Refreshments will be served before the talk at 3:00 p.m. in WSH 171.

All TCU students are encouraged to attend Parabola meetings, whether or not you are a member. Anyone interested in more information about Parabola may contact one of the three student officers: Bruce Doran, Lynette Kogler, and Laurie Love, or you may talk to the faculty sponsor of Parabola, Dr. Rhonda Hatcher.

TCU Research Lectureship for 1992-1993 is Scheduled

Dr. Bob Doran, the chairman of the TCU Mathematics Department and Lectureship Coordinator, has scheduled the Research Lectureship Series for the 1993-94 academic year. Nine mathematicians from universities in Texas and Oklahoma will be giving lectures this year.

The first talk in the Research Lectureship series will be presented by Professor David Delatte of the University of North Texas and is entitled "Dynamical Systems." The talk is scheduled for Tuesday, September 14 at 4 p.m. in WSH 145. Refreshments will be served in WSH 171 at 3:30.

Professor Robin Forman, of Rice University, will be our second speaker. He is presenting the talk "Laplacians on Graphs" on Tuesday, September 28 at 4 p.m. in WSH 145, with refreshments at 3:30 pm. in WSH 171.

A complete schedule is given on the third page of the newsletter. All TCU mathematics students are encouraged to attend the lectures.

Paul Sally Visit

Professor Paul Sally, of the University of Chicago, will be visiting TCU on September 23-24. Dr. Sally is very well known for his mathematical research in the area of group representations and for his work in mathematics education. During his visit to TCU, he will present talks on both research and education. The times and location of these talks will be arranged later, and announcements will be posted. Dr. Sally is a dynamic speaker, and his talks should be interesting to a wide audience.

Graphing Calculator Seminar

The Department of Mathematics will be conducting a faculty seminar entitled "Technology in the Mathematics Classroom—A Planning Seminar" on the use of graphing calculators in the mathematics classroom. This seminar will meet in WSH 145 at 3 p.m. Wednesday throughout the 1993-1994 school year.

Applications are now being accepted from students who wish to participate in the seminar. It is expected that two or three students will be partially supported by being furnished calculators for their use in the seminar, while other interested students who wish to participate may also apply. Student participants may be able to arrange to obtain one semester hour of credit for Math 4970, Special Topics. Requirements to be eligible for support are:

- Must expect to graduate no earlier than May, 1995,
- Must adjust their schedule to attend the seminar as scheduled,
- Must agree to be a Mathematics Clinic assistant (with pay) for at least two semesters, beginning Fall, 1994,
- Must have a written (informal) recommendation from at least one Mathematics faculty member.

Applications should include personal information (name, social security number, summer address), expected date of graduation, mathematics courses taken, experience as a Mathematics Department Assistant (if any), a statement agreeing to attend the seminar throughout the 1993-1994 school year and to subsequently work in the Mathematics Clinic for at least two semesters, and the names of faculty who have been asked to recommend the applicant. All applications should be given to Dr. Deeter as soon as possible.

TCU Mathematics Department a National Science Foundation Research Experiences for Undergraduates Site in Summer 1993

During the Summer of 1993, the TCU Mathematics Department was the site of a National Science Foundation Research Experiences for Undergraduate project entitled "Computational Group Theory and Graph Theory."

Six undergraduate research assistants participated in the project: Bruce Doran of TCU, Jonathan Berenbom of Haverford College, Joe Fendel of Harvard University, Gretchen Crouch of Oklahoma State University, Linda Lawton of Baylor University, and William Thill of Trinity University. They conducted research during the eight-week project under the direction of Dr. Rhonda Hatcher, Dr. George Gilbert, and Dr. David Addis of the TCU Mathematics Department. The research resulted in two papers "Groups of a Variant of the Hungarian Rings" and "Sliding Piece Puzzles with Oriented Tiles," which were presented by Linda Lawton and Jonathan Berenbom, respectively, at the Joint Annual Summer Mathematics Meetings in Vancouver, Canada on August 17, 1993.

Putnam Exam

The 54th annual William Lowell Putnam Mathematical Competition will be held on Saturday, December 4. Last year's exam is on one of the hall bulletin boards. The deadline for signing up is early October. Please contact Dr. George Gilbert (WSH 141, 921-7335) for more information or to sign up.

1993-1994 TCU RESEARCH LECTURESHIP SCHEDULE

MATHEMATICS DEPARTMENT

Robert S. Doran, 817-921-7335

Lectureship Coordinator

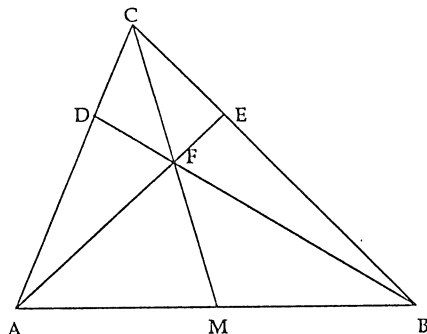
Refreshments at 3:30 in Winton-Scott 171

September 14, 1993 Tuesday Winton-Scott 145--4 p.m.	Title:	Professor David Delatte University of North Texas "Dynamical Systems"
September 28, 1993 Tuesday Winton-Scott 145--4 p.m.	Title:	Professor Robin Forman Rice University "Laplacians on Graphs"
October 11 & 12, 1993 Monday, October 11 Winton-Scott 145--4 p.m.	Title:	Professor Edward Dunne Oklahoma State University "Solving some Differential Equations by Using Everything You Know"
Tuesday, October 12 Winton-Scott 145--4 p.m.	Title:	"Building Conformal Manifolds out of Twistors"
October 19, 1993 Tuesday Winton-Scott 145--4 p.m.	Title:	Professor Marilyn Breen University of Oklahoma "Staircase Kernels for Orthogonally Starshaped Polygons"
November 16, 1993 Tuesday Winton-Scott 145--4 p.m.	Title:	Professor Robert Gompf University of Texas at Austin "Exotic Four Manifolds"
February 8, 1994 Tuesday Winton-Scott 145--4 p.m.	Title:	Professor Mark McConnell Oklahoma State University "Cohomology of Arithmetic Groups"
February 22, 1994 Tuesday Winton-Scott 145--4 p.m.	Title:	Professor Paul Goodey University of Oklahoma "Geometry of Convex Sets"
March 1, 1994 Tuesday Winton-Scott 145--4 p.m.	Title:	Professor William Beckner University of Texas at Austin "Fourier Analysis and Conformal Geometry"
April 12, 1994 Tuesday Winton-Scott 145--4 p.m.	Title:	Professor Sue Geller Texas A & M University "Cyclic homology: What is it and how do you compute it?" or "Spectral sequences for fun and profit"

Solution to the May 1993 Problem of the Month

Problem: A trisector divides a line segment into three equal parts. Show how to use a trisector and straightedge to find the midpoint of a line segment.

Solution: The following solution was conveyed by TCU senior Jonathan Campbell: To bisect AB , choose a point C off the line AB . Trisect AC and BC , letting D and E be the respective trisection points closest to C . If F is the intersection of AE and BD , then the line CF bisects AB at M .



Why? For any F interior to ABC , Ceva's theorem asserts that

$$\frac{AD}{CD} \cdot \frac{CE}{BE} \cdot \frac{BM}{AM} = 1$$

In our case, it follows that $AM = BM$.

For a second solution, take C off the line AB , trisect AC at D and E , with D closer to C . Let F be the trisection point of BE closest to E . Then the line DF intersects AB at its midpoint. Why? The line BE is a median of $\triangle ABC$. The medians of a triangle intersect at the point two-thirds of the way from the vertex to the midpoint. Thus, F is this point and BF is a median of $\triangle ABC$.

Problem of the Month

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 $z \leq n + 1$.

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.