TCU Math News Letter

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The mind is not a vessel to be filled, but a flame to be kindled

--- Plutarch

Editor: Dr. Rhonda Hatcher and Archive of Newsletters

Green Honors Chair Visit, September 21-23

Professor Frank Morgan of Williams College will be visiting the Mathematics Department at TCU as the Green Honors Chair. He will be on our campus from Sunday, September 21 through Tuesday, September 23.

Professor Morgan will present four talks during his visit. His first talk, a public lecture entitled 'Soap Bubbles and Mathematics,' will be at 4:00 p.m., Sunday, September 21 in Sid Richardson Building, Lecture Hall 2. He will report on soap bubbles in the recent math news, followed by a guessing contest with demonstrations, explanations, and prizes. The talk is open to everyone (4th grade and above). Refreshments will be served after the talk.

Lunchtime talks by Professor Morgan, with free pizza and drinks provided, are scheduled for Monday, September 22 and Tuesday, September 23 at 12:00 noon in Tucker Technology Center 139. The Monday talk, 'Pizzas, Bubbles, and other IsoperimetricÂ[1] Shapes,' will include a discussion of some results proved by undergraduates. The Tuesday talk, 'Double Bubbles in Other Universes,' will explore the question of what double soap bubbles should look like in other universes. This talk will also include results by students and open questions.

On the afternoon of Monday, September 22 at 4:00 p.m. Professor Morgan will present the talk 'The Double Soap Bubble Theorem.' This talk will focus on the 2002 result showing that the familiar double soap bubble is the least-perimeter way to enclose and separate two given volumes. Refreshments will be served in TTC 300 at 3:30 p.m.

Professor Morgan earned his undergraduate degree from MIT and his PhD from Princeton University. He taught at MIT from 1977 to 1987 and has been a faculty member at Williams College since 1987. Professor Morgan works in minimal surfaces and studies the behavior and structure of minimizers in various dimensions and settings.

In January 1993, Professor Morgan was honored with a Mathematical Association of America national award for distinguished teaching. During the 1997-98 academic year, he held the first Visiting Professorship for Distinguished Teaching at Princeton University. He served as Second Vice-President of the MAA from 2000-2002.

Poincare' Conjecture Lecture Series

Over one hundred years ago, French mathematician Henri Poincare' conjectured that the three-dimensional sphere is the only closed, connected and simply connected topological 3-dimensional manifold. In other words, it is the only 3-dimensional object that really acts like the sphere in public. Mathematicians worked intensely on this problem during the last century, but no proof was found. The importance and intrigue of this problem led the Clay Mathematics Institute to include it among the seven 'Millennium Prize Problems' (see www.claymath.org); these are the top seven unsolved problems in mathematics, and a million-dollar award is offered for the solution to any one of these. Nobody has collected $1 million yet for any of these problems, but Grisha Perelman from the Steklov Institute of Mathematics announced in April that he has proved Poincare'. He described his proof in a series of three papers, the last of which was released in late July. In this series of lectures, we will explain the problem and its history. The first few should be accessible to a Parabola club audience, but the last two will probably be more technical.

The dates and titles of the talks are: Sept. 16: 'History and Statement of the Poincare' Conjecture'; Sept. 30: 'History and Statement of Geometrization Conjecture: Why does it prove Poincare'?'; Oct. 7 and Oct. 14: 'Hamilton's program: What is Ricci curvature? What is Ricci flow?'; Oct 21: 'Perelman's approach: How can he make Hamilton's program work?' All talks will be in Tucker Technology Center 138 at 3:30 pm on Tuesday with cookies in TTC 300 at 3:00 pm.

Solution to April 2003 Problem of the Month

Problem: Three drummers are positioned at the corners of a large equilateral triangle. Each drummer beats his drum at a constant rate with the time between beats equal to the time it takes for the sound to travel the length of one side of the triangle. The drums are synchronized so that a listener standing in the center of the triangle would hear all three beats simultaneously. This also means that it seems to each drummer that the other two drums are in synch with his own drum (actually they are delayed by one beat). Where else can a listener stand and hear all three drums in synchronization? (Scott Kim, Pi Mu Epsilon Journal)

Solution: There are no other places (in the plane). The difference of the distances from such a point to two of the drummers must be any integer multiple of the length of the side of the equilateral triangle. However, by the triangle inequality, the absolute value of such a difference can be at most the length of the side of the equilateral triangle, with equality possible only if the point in question and the location of the two drummers are collinear. When we consider all three drummers at once, we see that no other such positions than those given exist.

September 2003 Problem of the Month

This month's problem was the first problem in the first year (1966) of the annual Indiana College Mathematics Competition. Show that the equation $x^2 + y^2 = a^3$ always has integer solutions whenever a is a positive integer.

[Ed. As stated, this problem has a typo that renders it false. It is correctly stated in the next issue.]

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).