TCU Math Newsletter

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One cannot escape the feeling that these mathematical formulae have an independent existence and an intelligence of their own, that they are wiser than we are, wiser than even their discoverers, that we get more out of them than we originally put into them.

- Heinrech Hertz

Mathematics of DNA Testing

Professor Phil Hartman of the TCU Biology Department will present the next Parabola talk. In his talk, entitled "Will DNA Dissolve in OJ," Dr. Hartman will discuss DNA testing and the mathematics used in computing the probabilities involved. Dr. Hartman is very knowledgeable in the field of DNA testing and has served as an expert witness in criminal trials.

The talk will be presented in Winton Scott Hall 145 at 3:30 p.m. on Tuesday, November 22. Refreshments will be served at 3:00 p.m. in Winton Scott Hall 171. All TCU students, faculty, and others are encouraged to attend Parabola meetings, whether or not you are a member.

TCU Lectureship Series

Professor James Cogdell from Oklahoma State University, will be the fourth speaker in the TCU Research Lectureship Series. Dr. Cogdell, a number theorist, will present his talk, "Hecke's Converse Theorem for GL(n)," on Tuesday, November 8, at 4:00 p.m. in Winton Scott Hall 145. Refreshments will be served at 3:30 p.m. in Winton Scott Hall 171.

Another "Proof" of Fermat's Last Theorem is Announced

Professor Andrew Wiles, of Princeton University, has presented a new proof of Fermat's Last "Theorem." This very famous conjecture can be stated as follows: For any integer $n > 2$, the equation

$$x^n + y^n = z^n$$

has no solution in which x, y, and z are positive integers. The problem has intrigued mathematicians for centuries, in large part due to the fact that in the early 17th century the famous French mathematician Pierre de Fermat wrote in the margin of his copy of Diophantus' *Arithmetica* that he had "discovered a truly wonderful proof, but the margin is too small to contain it."

Dr. Wiles caused quite a stir in the summer of 1993 when he announced that he had proven Fermat's Last Theorem. However, this proof was found to have a gap. He now claims to have a complete and correct proof, but full confirmation of this claim will be made only after the proof has been carefully checked by many mathematicians.

Problem of the Month

Consider a 9 x 9 checkerboard (consisting of 81 squares). If one removes three corners, can the remainder be covered with twenty-six 3x1 tiles?

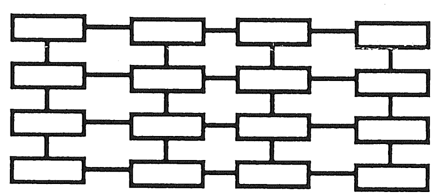
Students and others are invited to submit solutions to Dr. George Gilbert (Math Dept. Office or P.O. 32903). Correct solutions submitted by persons who are not members of the TCU math faculty will be acknowledged in the next issue of the newsletter. Note that a correct solution is an answer and a justification of its correctness. The solution to the problem will be published in the next edition of the newsletter.

Solution to the October 1994 Problem of the Month

Problem: On his daily campus stroll, Wayne visited each building exactly twice using only the paths shown in the diagram below. When he got back to his office, he told Kathy that he had visited the buildings in the order

A O N H K L E C F B P I M G D J M L N H J K D G P B F I E O A C.

After a little thought, Kathy said, "Wayne, you're not quite right." Reconsidering, Wayne responded, "I see that I've carelessly transposed two successive buildings at exactly one point in the order." Without knowing which building is which on the map, name the transposed buildings.



Solution: The transposed buildings are J and K. One way to solve the problem would be to draw a graph connecting buildings that are claimed to be adjacent. After trying to fit it to the given graph, one can guess that J and K are transposed in Wayne's report of the trip. However, more work is required to show that no other possible transpositions exist. This will work out, but takes a while. A quick solution is to color the buildings red and black in a checkerboard pattern. Then all paths connect red buildings to black buildings. Writing down the buildings in two columns corresponding to the colors, we see that J and K appear in both columns, so that J and K must be the transposed buildings. The labeled map (unique up to rotation) appears below.

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A — O — N — H
|   |   |   |
C — E — L — K
|   |   |   |
F — I — M — J
|   |   |   |
B — P — G — D
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TCU students Sanitago Lombeyda, Mark Luckstead, Mitsutaka Shiraski, Anna Mueller, and Allen Sulgrove all correctly determined that J and K could have been transposed. Santiago, Anna, and Allen went on to show that no other pair could have been transposed instead.

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. 32903).