Mathematics and Computer Science

NEWSLETTER

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Hendrix-Rhodes-Sewanee Undergraduate Symposium here April 20th

The annual Undergraduate Mathematics Symposium sponsored jointly by Hendrix College in Conway, Arkansas, the University of the South at Sewanee, and Rhodes will be held at Rhodes on Friday, April 20. The guest speaker is Frank Morgan, chair of the Mathematics Department at Williams College in Williamstown, Massachusetts. His mathematical research interests lie in the study of minimal surfaces (soap films and surfaces in three and higher dimensions). Currently he is director of an NSF Research Experience for Undergraduates (REU) site at Williams and is an avid expositor of mathematics to audiences ranging from elementary school students to mathematicians. At the Symposium he has agreed to give two talks, tentatively entitled “Soap Films, Efficient Networks, and Undergraduate Research” and “Crystals, Pivalic Acid, and Minimal Surfaces”. All are invited to attend the student talks as well as those of Professor Morgan! The schedule will be published during the week preceding the Symposium.

Putnam Results

In December a group of Rhodes students competed in the Putnam Mathematics competition. This was the first time in a number of years that Rhodes has had a Putnam team and the first time for each of the participants. The top scorer from here was Brad Greeley, a sophomore Physics major.

Math Student Awards

Jason Greene, a third-year Mathematics and Economics major, is this year’s recipient of the Robert Allen Scott Award, a prize of $2000 given to an outstanding rising fourth-year major to support research or study during the summer preceding the fourth year. Jason will be working here at Rhodes with Tom Barr on a topic in dynamical systems.

David Assaf, a first-year mathematics major has received a summer research grant from the Pew Foundation Mid-States Consortium. The $2500 grant will provide him support for studying “chaos” in discrete dynamical systems. Steve Gadbois will be directing his work.

Darol Timberlake, a third-year Mathematics and Economics major has been tapped for Mortar Board.

Congratulations to all and best wishes for a productive summer!

Personals, etc.

Ken Williams became a grandfather on February 3. Ross Kenneth Gilbert was born to his daughter Kenna; he weighed in at 9 and a half pounds. Recently circulated photos show a happy grand-dad holding an equally happy baby. Congratulations, Ken!

Ken Williams, Steve Gadbois, Terri Lindquester, and Tom Barr attended the Joint Meetings of the AMS and MAA in Louisville, January 17 - 20.

Steve Gadbois attended and spoke at the southeastern regional meeting of the National Council of Teachers of Mathematics in Chattanooga, March 15 - 16.

Solution to Problem 7

Problem 7: Consider the points $A(-1,1)$, $B(1,1)$, and $C(1,-1)$ in the Cartesian plane. Suppose one starts at $(0,0)$, picks either A, B, or C at random and with equal probability, and moves halfway to that point. The resulting point becomes the starting point and the process repeats infinitely often. Describe the *smallest* region in which all the points *must* lie.

Solution due to David Assaf ('93):

[Editor's note: The smallest region in which all the points must lie is the "Sierpinski triangle"; the figure at the top of the first page of the January 11, 1989 newsletter and reprinted here is a computer-drawn approximation of it. Michael Barnsley calls this construction the "chaos game".] First notice that the given region is contained in $\triangle ABC$. Now, consider any point x inside the largest "excluded region" of the Sierpinski triangle. If x is in the given region, then it would be halfway between one of the three points A, B, or C and a point x' from which x was determined. But then x' is outside $\triangle ABC$, a contradiction. So the given region can not include any points in the largest excluded region of the Sierpinski triangle, and similarly, it can not include any points in the smaller excluded regions. Thus, the given region is contained in the Sierpinski triangle. On the other hand, it is not hard to see that any of the points of the Sierpinski triangle can be gotten arbitrarily near under the construction. So the given region is precisely the Sierpinski triangle.

Solution to Problem 9

Problem 9: A certain number of cows (x) are sold for \$$x$ apiece. The money is used to buy as many sheep at \$10 apiece as possible. With the remaining money a dog is purchased. The animals (including the dog) are then divided into two groups of equal size. How much did the dog cost? (suggested by Professor Fritz Stauffer)

Solution due to Kellee LaCount ('92) of Gastonia, NC:

The number of cows satisfies $x = 10a + b$ where a and b are nonnegative integers and $b < 10$. So the amount of money received is $x^2 = 100a^2 + 20ab + b^2$. Since an odd number of sheep were purchased, b^2 must have an odd tens digit; the only possibilities are $b^2 = 16$ or $b^2 = 36$. In either case, the ones digit of b^2 is 6, so the dog cost \$6. [Editor's note: neither the number of cows nor the number of sheep can be determined, nor do they need to be.]

Complete solutions were also received from Professor Kevin Ogle, Professor Fritz Stauffer, Diana Lecky ('85), and Alex Yeilding ('72).

Problem 10

Suppose a square sheet of paper is folded once on a straight line passing through the center of the sheet. For which line is the area of the resulting figure maximized?

In 1973 and 1974 Roger Penrose discoverd three sets of shapes which can be pieced together to cover (or *tile*) the plane, and which also have the property that any such tiling is *aperiodic* (i.e. it is impossible to translate the grid of boundary segments so that the translated grid coincides with the original one.) The set of six tiles on the front page is one of the Penrose aperiodic sets. Try tiling with these!

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