TCU Math News Letter

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A good mathematical joke is better, and better mathematics, than a dozen mediocre papers.

- J. E. Littlewood

Editor: Dr. Rhonda Hatcher and Archive of Newsletters

Job Candidate Talks

Four candidates for an assistant professor position in the TCU Mathematics Department will be visiting campus during the first weeks of March. Each candidate will be giving two talks during their visit, and all TCU students and faculty are invited to attend.

The first candidate to visit will be Dr. Gautum Chinta, who is currently at Brown University. On Wednesday, March 3 he will give two talks. The first is a talk intended for undergraduates entitled "Proofs That There Are Infinitely Many Primes." It will be given in Tucker Technology Center 245 at 12 noon. A pizza lunch will be served at 11:30 in TTC 300. Dr. Gautum's second talk, "The Theory of Multiple Dirichlet Series" is a research-level talk. It will be given at 3:30 p.m. in TTC 243.

Dr. Ralf Schmidt of the University of Minnesota will be the next visiting candidate, and he will give two lectures on Thursday, March 4. His undergraduate lecture is "How to Measure the Length of a Curve." He will present the talk at 12:30 p.m. on Thursday, March 4 in TTC 244, and there will be a pizza lunch at 12 noon in TTC 300. Dr. Schmidt's research-level talk is "Analytic Properties of Certain L-functions," and it will be in TTC 137 at 3:30 p.m.

On Monday, March 8, a third candidate, Dr. Vitali Kapovitch of the University of California, Santa Barbara, will be presenting his lectures. His undergraduate lecture, "Introduction to Geometry of Surfaces," will be at 12 noon in TTC 243 and preceeded by a pizza lunch at 11:30 a.m. in TTC 300. Dr. Kapovitch's will present his research talk, "Classification of Negatively Pinched Manifolds with Nilpotent Fundamental Groups," in TTC 243 at 3:30 p.m.

The fourth candidate to visit will be Dr. John Brevik of Wheaton College. He will present two lectures on Thursday, March 11. Dr. Brevik's undergraduate lecture is entitled "Cycloids: A Couple of Old Chrones." He will present it at 12:30 p.m. in TTC 244, and there will be a pizza lunch before the talk at 12 noon in TTC 300. He will present his research lecture, "Curves on Cubic Surfaces, Smooth and Otherwise," at 3:30 p.m. in TTC 137.

Texas Section MAA Meeting

The 2004 Meeting of the Texas Section, Mathematical Association of America will be held at Texas A&M University-Corpus Christi in Corpus Christi, Texas, April 1-3, 2004.

Of particular interest to undergraduate students is a Student Forum on Friday, April 2 from 10:30-11:30 a.m. The forum is entitled "Combinatorics, Graph Theory and Computing: Connections and Interplay," and will be presented by Minerva Cordero of the University of Texas at Arlington. On the afternoon of April 2, a Student Paper Session will be held from 2:30-4:45 p.m. followed by a student pizza and puzzle party at 5:30 p.m.

More information about the conference along with registration forms and housing information can be found at the web site http://orgs.tamu-commerce.edu/maa/2004-cc.html.

Solution to the February 2004 Problem of the Month

Problem: Let F be a function from the interval [0,1] to itself having the following properties:

(i) F is increasing, i.e. $x \le y$ implies that $F(x) \le F(y)$;
(ii) $F(x/3) = F(x)/2$;
(iii) $F(x) + F(1 - x) = 1$.

Find the values of $F(1/13)$ and $F(1/2^{1/2})$. (Nordic Mathematical Contest.)

Solution: Computing $F(1/13)$ requires only properties (ii) and (iii).

$$F(1/13) = \frac{F(3/13)}{2} = \frac{F(9/13)}{4} = \frac{1-F(4/13)}{4} = \frac{1-\frac{F(12/13)}{2}}{4}$$
$$= \frac{1-\frac{1-F(1/13)}{2}}{4} = \frac{1+F(1/13)}{8}.$$

It follows that $F(1/13)=1/7$.

Property (ii) implies that $F(0)=0$. Applying properties (iii), (ii), and (iii), in turn, yields $F(1)=1$, $F(1/3)=1/2$, and $F(2/3)=1/2$. Property (i) now implies $F(x)=1/2$ for $1/3 \le x \le 2/3$. From (ii), $F(x)=1/4$ for $1/9 \le x \le 2/9$. We now proceed similarly for $F(1/\sqrt{2})$, checking as we go that we only apply F to values between 0 and 1, until we obtain a value of x in an interval where we know F, here [1/9,2/9].

$$F\left(1/\sqrt{2}\right) = 1 - F\left(1-1/\sqrt{2}\right) = 1 - \frac{F\left(3-3/\sqrt{2}\right)}{2} = \frac{1+F\left(3/\sqrt{2}-2\right)}{2} = \frac{2+F\left(9/\sqrt{2}-6\right)}{4}$$
$$= \frac{3+F\left(7-9/\sqrt{2}\right)}{4} = \frac{3+2F\left(7/3-3/\sqrt{2}\right)}{4} = \frac{3+2F(0.21201296...)}{4}$$
$$= \frac{3+2(1/4)}{4} = \frac{7}{8}.$$

March 2004 Problem of the Month

Find the equation of the line passing through (1,1) which divides the region bounded by $y=x^2$ and $y=1$ into two subregions of equal area.

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).