TCU Math Newsletter

I believe that scientific knowledge has fractal properties, that no matter how much we learn, whatever is left, however small it may seem, is just as infinitely complex as the whole was to start with. That, I think, is the secret of the universe.

- Isaac Asimov

TCU Mathematics Student Organization Meeting Features Guest Speaker Tom Garrity on Tuesday, April 3

TCU students Drew Curd and Brian Preskitt are restarting Parabola, the TCU mathematics student organization. The first meeting of Parabola will feature a talk by Dr. Tom Garrity from Williams College. His talk is entitled "On Writing Numbers," and will be presented at an undergraduate level.

The talk begins at 1:00 pm in TUC 139, and there will be free pizza for lunch in TUC 300 before the talk. Right after the talk, Drew and Brian will be collecting names of students interested in joining Parabola. All interested TCU undergraduates are invited to join.

Math Majors Honored

Dan Shedd has been named the 2012 Mathematics Department Senior Scholar. The winner of the award is determined by the Mathematics Department Faculty.

Mathematics major Kelly Jackson was invited to join the prestigious national honor society Phi Beta Kappa. She will be initiated into membership in May 2012.

Calculus Bee on Tuesday, April 24

The annual TCU Mathematics Department Calculus Bee will be held on Tuesday, April 24 at 3:30 p.m. in Tucker Technology Center 244. Refreshments for the contestants will be served at 3:00 p.m. in TUC 300. All TCU undergraduates are eligible to compete. Prizes will be awarded to the top three finishers, with $75 for first place, $50 for second place, and $25 for third place.

Students wishing to compete in the Calculus Bee should sign up in the Mathematics Department office in TUC 206. While there is no deadline for signing up, we would like to know who is participating as soon as possible.

Strong Putnam Competition Performance by Brian Preskitt

TCU mathematics major Brian Preskitt scored in the top ten percent of national scores on the 2011 William Lowell Putnam Competition, an excellent performance in this very difficult competition.

Frank Stones Colloquium Talks

Dr. Tom Garrity from Williams College will present "A Thermodynamic Classification of Real Numbers" at 3:30 pm on Tuesday, April 3 in TUC 246. Refreshments will be served at 3:00 pm in TUC 300. Professor Jeffrey Dancinger will also speak in April at a time and date to be determined. Watch the Mathematics Department web page for details.
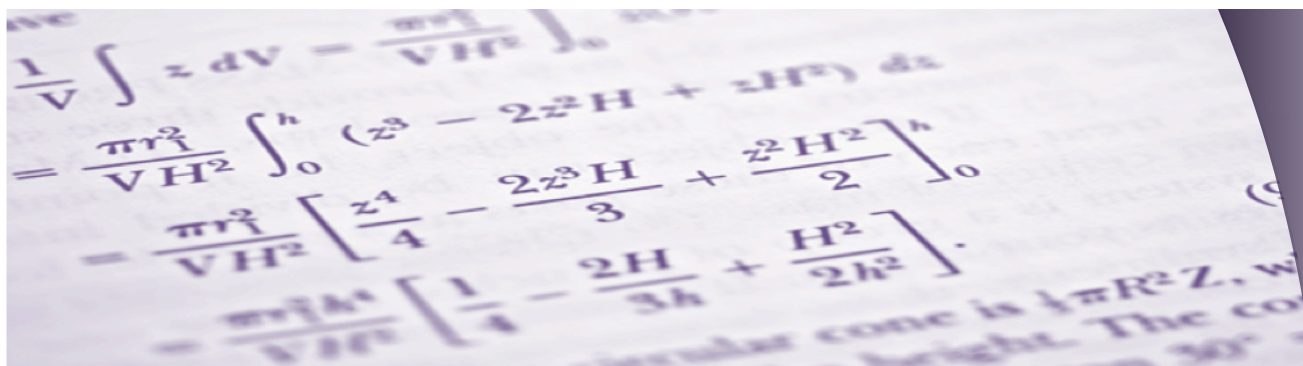
Solution to the March 2012 Problem of the Month

Problem: Show that there is a positive integer n with first (leading) digit 1, such that n^2 has first digit 2, n^3 has first digit 3, and n^4 has first digit 4. Show that is not possible to further have 5 as the first digit of n^5.

Solution: The smallest of the infinite number of possibilities is 145. Write n in scientific notation as $a \times 10^k$. Note that $1 \le a < 2$, so
$$a^2 < 4 < 20,\ a^3 < 8 < 30,\ a^4 < 16 < 40,\ a^5 < 32 < 50.$$
Thus, for all five conditions to hold, we must have
$$1 \le a < 2,\ 2 \le a^2 < 3,\ 3 \le a^3 < 4,\ 4 \le a^4 < 5,\ 5 \le a^5 < 6.$$
In particular, we must have $a \ge \sqrt[3]{3} = 1.4422\ldots$ and $a < \sqrt[5]{6} = 1.4309\ldots$, which is impossible.

This month's problem was solved by Brad Beadle ('96).

April 2012 Problem of the Month

Suppose a polynomial $p(x)$ has integral coefficients and that $p(n)$ is divisible by $n^2 + 1$ for infinitely many integers n. Must $p(x)$ be divisible by $x^2 + 1$?

Students and others are invited to submit solutions to Dr. George Gilbert by e-mail (g.gilbert@tcu.edu) or hard copy (Math Dept. Office or TCU Box 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.