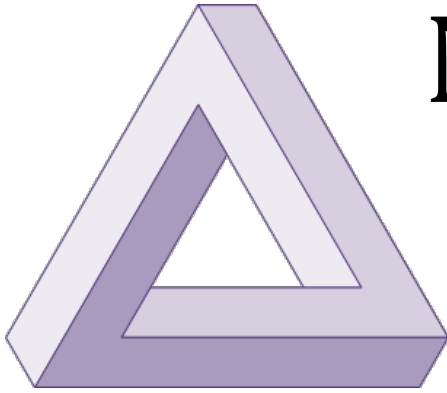# TCU Math Newsletter

The infinite! No other question has ever moved so profoundly the spirit of man.

- *David Hilbert*

Frank Stones Colloquium Talks on April 1 and 29

Professor Sho Tanimoto from Rice University Commerce will present the talk "Distribution of *S*-integral points on algebraic varieties " on Tuesday, April 1 at 3:30 pm in TUC 246. Professor Jayadev Athreya of the University of Illinois, Urbana will present a second April talk in the Frank Stones Colloquium series on Tuesday, April 29 at 3:30 pm. The talk title and room location will be posted on the TCU Mathematics Department web page later this month. Refreshments will be served before both talks in TUC 300.

April Actuarial Talk

Mr. Brian Levine, a Partner at Advocate Reinsurance, and TCU mathematics major Janson Oyler, who is working as an intern at Advocate will present the talk "Actuaries and Reinsurance Brokers" on Wednesday, April 2 at 2:00 pm in TUC 352. They will discuss how actuaries, a.k.a "brok-tuaries," play a central role in reinsurance property and casualty brokerage firms through involvement with catastrophe modeling, reinsurance pricing, capital management, product structuring, sales and client management.
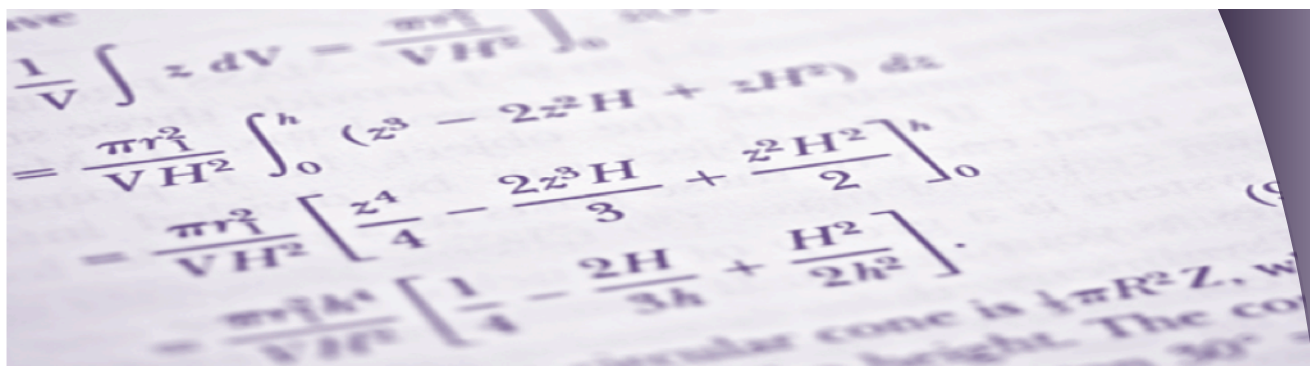
Calculus Bee on Tuesday, April 22

The annual TCU Mathematics Department Calculus Bee will be held on Tuesday, April 22 at 3:30 pm in Tucker Technology Center. Those wishing to compete should arrive for refreshments and contestant number assignment at 3:00 pm in TUC 300. All TCU undergraduates are eligible to compete. Barnes & Noble gift cards will be awarded to the top three finishers, with $75 for first place, $50 for second place, and $25 for third place.

Participants will answer questions that are projected on a screen on a sheet of paper, and faculty graders collect the papers after each round. Contestants are allowed two errors each, but they are eliminated from the competition on the third strike. The material covered is Calculus I and II, but not beyond the material that current Calculus II students have had.

Math Majors Honored

Karl Wood has been named the 2014 TCU Mathematics Department Senior Scholar. The winner of the award is determined by the Mathematics Department Faculty.

Math majors Marie Ballard and Katie Grebel will be inducted in the mathematics honor society Pi Mu Epsilon later this month. Drew Curd, Thomas Hale, Xin Su, and Karl Wood were initiated last year.

Solution to the March 2014 Problem of the Month

Problem: Let a and r be positive constants. Prove that $e^x = ax^r$ has at most two positive solutions.

Solution: Rewrite the equation as $x = \ln a + r \ln x$, from which we are led to consider the function $f(x) = x - r \ln x$. Its derivative is $f'(x) = 1 - r/x$. Thus, f has one critical number, $x = r$. Thus, f has at most one turning point (in fact, it is a local minimum) and hence at most two roots.

The March Problem of the Month was solved by Dave Thompson.

April 2014 Problem of the Month

This month's problem comes from *The Inquisitive Problem Solver*, by Paul Vaderlind, Richard Guy, and Loren Larson. Can you build a 3×3×3 cube with thirteen 1×1×2 blocks if the 1×1×1 space in the center is empty?

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.