TCU Math Newsletter

I never did understand the trick of doing things like you were "supposed to."
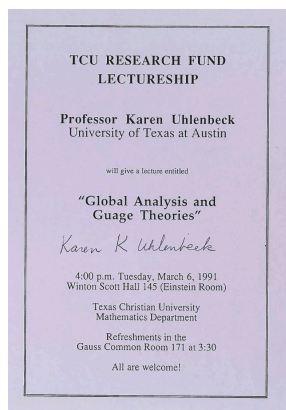
- Karen Uhlenbeck

Karen Uhlenbeck Wins the Abel Prize

Dr. Karen Uhlenbeck, an emeritus professor at the University of Texas at Austin, was awarded the Abel Prize for Mathematics. She is the first woman to have been honored with the award. The award citation recognizes "the fundamental impact of her work on analysis, geometry and mathematical physics."

There is not a Nobel Prize in mathematics. The prestigious Fields Medal for mathematics is awarded only every four years and the awardees must be 40 or younger. In 2014, Maryam Mirzakhani became the only woman to receive a Fields Medal. The Abel Prize, named after the Norwegian mathematician Niels Hendrik Abel, was first awarded in 2003. It is similar to the Nobel Prize and is awarded every year. The award includes a $700,000 prize.

Dr. Uhlenbeck gave a colloquium talk at TCU in 1991. The talk flyer and a picture of her during her visit are shown below.

TCU RESEARCH FUND
LECTURESHIP

Professor Karen Uhlenbeck
University of Texas at Austin

will give a lecture entitled

"Global Analysis and
Guage Theories"

Karen K Uhlenbeck

4:00 p.m. Tuesday, March 6, 1991
Winton Scott Hall 145 (Einstein Room)

Texas Christian University
Mathematics Department

Refreshments in the
Gauss Common Room 171 at 3:30

All are welcome!

Colloquium Talk on April 26

Professor Souvik Goswami of Texas A&M University will present the talk "Height Pairing" in the TCU Colloquium Series on Friday, April 26 at 3:30 pm in TUC 243. Refreshments served in TUC 300 at 3:00 pm.

Math Majors Honored

Wellington Owen has been named the 2019 TCU Mathematics Department Senior Scholar. The winner of the award is determined by a vote of the Mathematics Department Faculty.

Math major Dominic Micheli will be initiated into the mathematics honor society Pi Mu Epsilon later this month. Math majors Luke Beasley, Peter Doré, Claire McGrady, Talha Mushtaq, and Kelli Pedersen and graduate student Thinh Doan are current members.

Math major senior Kelli Pedersen and junior Trinh Ha will be initiated into Phi Beta Kappa this May. Math major Wellington Owen was initiated last year as a junior.

Congratulations to all of these students on their achievements.

Calculus Bee on Monday, April 22

The annual TCU Mathematics Department Calculus Bee will be held on Monday, April 22 at 3:30 pm in TUC 244. The material covered is Calculus I and II, but not beyond the material that current Calculus II students have had. There will be refreshments for contestants in TUC 300 between 3:00 pm and 3:30 pm. All TCU undergraduates are eligible to compete. TCU bookstore gift cards will be awarded to the top three finishers, with $75 for first place, $50 for second place, and $25 for third place.
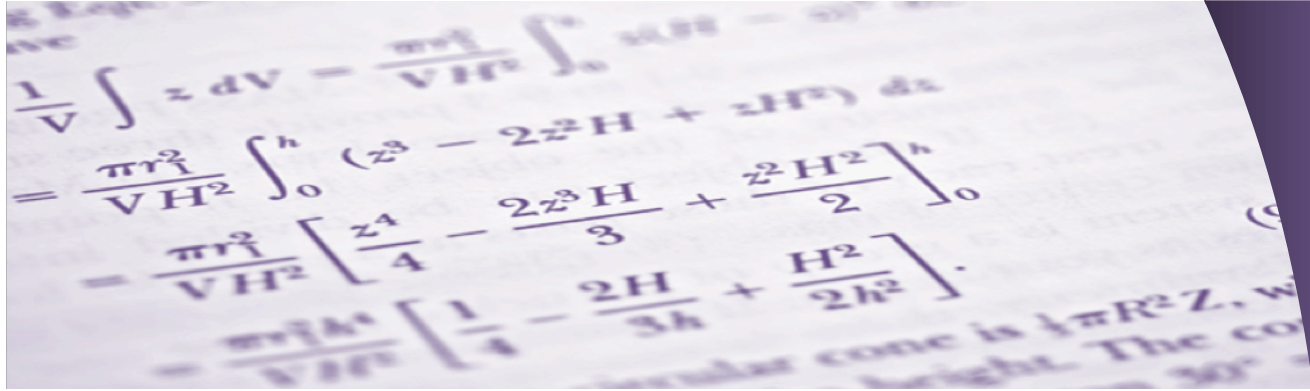
Solution to the March 2019 Problem of the Month

Problem: Let $a_0 = 1$ and, for $n \geq 0$, let $a_{n+1} = (1 - 1/2^{n+1})a_n$. Prove that the sequence (a_n) converges to a number that is at least $1/4$.

Solution: Because (a_n) is decreasing and positive, it converges to a nonnegative number. We prove that $a_n \geq 1/4 + 1/2^{n+1}$ by induction. We have equality for $n = 1$ (and strict inequality for $n = 0$). Then, for $n \geq 1$,
$$a_{n+1} \geq \left(1 - \frac{1}{2^{n+1}}\right)\left(\frac{1}{4} + \frac{1}{2^{n+1}}\right) = \frac{1}{4} + \frac{1}{2^{n+2}}\left(2 - \frac{1}{2} - \frac{1}{2^n}\right) \geq \frac{1}{4} + \frac{1}{2^{n+2}}.$$

Remark. The limit is $0.288788095086602\ldots$.

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

April 2019 Problem of the Month

Let n be a positive integer. Determine the number of real roots of
$$1 + 2x + 3x^2 + \cdots + (n - 1)x^{n-2} + nx^{n-1}$$
as a function of n.

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.