



# TCU Math Newsletter

*We could use up two eternities in learning all that is to be learned about our own world and the thousands of nations that have arisen and flourished and vanished from it. Mathematics alone would occupy me eight million years.*

*- Mark Twain*

## **Talk on the Mathematics of Voting on Tuesday, November 1**

Dr. Efton Park and Dr. Rhonda Hatcher of the TCU Mathematics Department will present the talk "The Mathematics of Voting: Paradoxes of Democracy" on Tuesday, November 1 at 3:30 in TUC 139. Refreshments will be served beforehand at 3:00 in TUC 300.

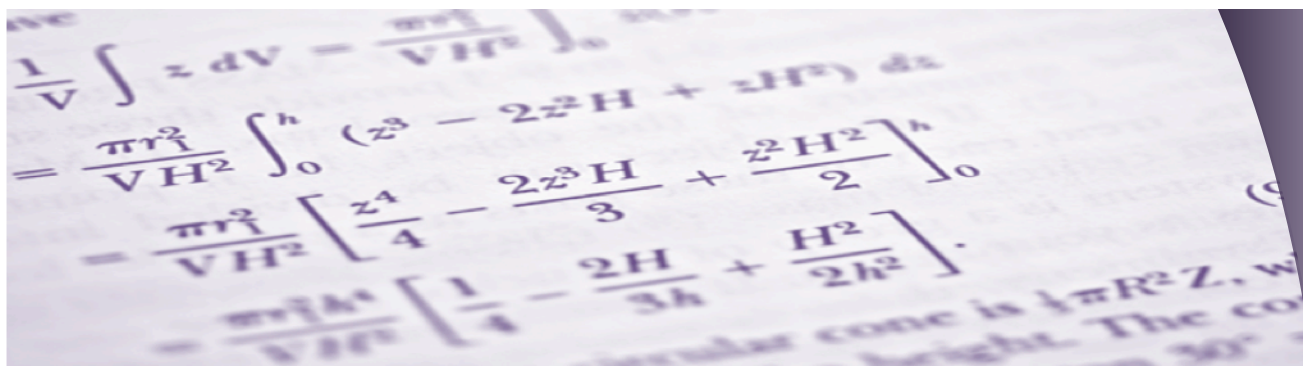
The talk is aimed at a general audience, and investigates the question of whether a fair and democratic voting method exists. When there are only two candidates, the answer is easy: majority rules. But when there are three or more candidates, the fairest method of voting is not so evident. In this talk, we will look at the mathematics behind several voting methods. We will see that surprising paradoxes arise with any method, leading us to Arrow's Impossibility Theorem, which essentially says there is no ideal voting system. We will also take a look at the Electoral College and investigate which voters and states have the most power under this system.

## **TCU Math Major Seth Emblem Receives American Mathematical Society Award**

The American Mathematical Society made a \$3,000 award to Seth Emblem. Seth is a TCU senior mathematics-actuarial, economics, and philosophy triple major pursuing a BA degree in mathematics-actuarial and a BS degree in economics. He is interested in how his three fields of study intertwine and how they collectively can solve complex problems in the world. Last summer, Seth served in an actuarial internship at Texas Farm Bureau Insurance in Waco, Texas. After graduation, Seth plans to pursue a career in the actuarial field, but he is also interested in the study of happiness as a mathematical, economical, and philosophical concept.

## **Colloquium Talk on November 8**

Professor Gordon Heier from the University of Houston will present a Frank Stones Colloquium talk "On Holomorphic Sectional Curvature and Complex Geometry" on Tuesday, November 8 at 3:30 pm in TUC 352. Refreshments will be served at 3:00 pm in TUC 300.



## Solution to the October 2016 Problem of the Month

**Problem:** Use the basic operations of arithmetic (addition, subtraction, multiplication, and division) to obtain the value 21 using each of the prime numbers 2, 3, 5, and 7 exactly once.

**Solution:**  $2 \cdot (5 + 7) - 3 = 21$ .

Try to do it with just two different operations. Go to <http://mathematics.tcu.edu/wp-content/uploads/2016/10/OctPOMSol2.pdf> for the answer.

This month's problem was solved by undergraduates Linh Nguyen, Tao Peng, and Hannah Richstein, and by local resident Roger Bevan, who was a mathematics

## November 2016 Problem of the Month

Given a positive integer  $k$ , show that there is a positive integer  $n$  such that

$$(\sqrt{2} - 1)^k = \sqrt{n+1} - \sqrt{n}.$$

Students and others are invited to submit solutions to Dr. George Gilbert by e-mail ([g.gilbert@tcu.edu](mailto: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.