Department of Mathematics

October 22, 2018

UNDERGRADUATE MATH SEMINAR

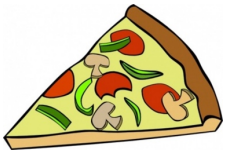
Professor Paul Friedman

The next seminar of the term will be

DATE: **THURSDAY, October 25**

Time & **12:30pm –** Refreshments in **Bailey 204**

Location: **1:00 –** Seminar in **Bailey 207**



In this seminar, **Professor Paul Friedman** from the Department of Mathematics at **Union College** will deliver the following talk

Title: Solving the General Cubic Equation $ax^3 + bx^2 + cx + d = 0$

Abstract: The solution to the general quadratic equation, $ax^2 + bx + c = 0$, is well-known to most high school students:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

It was also known to many "ancient" cultures … some dating back to 2000 BC! However, the solution to the general cubic equation, $ax^3 + bx^2 + cx + d = 0$, is not as well-known, and it was not found until the 1500s.

In this talk, we will look at how the Renaissance mathematicians Scipione del Ferro, Tartaglia, and Cardano, solved the cubic equation, though we will do so using modern language and notation. As a cute consequence, we will be able to derive some remarkable identities, such as

$$\sqrt[3]{26 + 15\sqrt{3}} + \sqrt[3]{26 - 15\sqrt{3}} = 4.$$

Where Are They Now? Leah Murphy (née Ziamandanis) '07 Checks-in!

After graduating as a mathematics major from Union in '07 and Union Graduate College in '08, I began work in IT sales for a local company called Garnet River. The math degree from Union played a central role in landing my first job and as well as my current sales position at Dell EMC (2011 - present). My math background proved to be a calling card of "smarts" that made me a compelling candidate to employers and for acceptance into the Business Analytics master's program at RPI ('18). The analytical and reasoning skills I honed at Union over countless problem sets serve me well in the work place (there is a math joke in there somewhere about sizes of infinity or countable sets). I feel so much appreciation for the Math Department at Union! Particularly, Alan Taylor, Brenda Johnson, Julius Barbanel, Pedro Texiera, Kelly Black, and Paul and Christina Friedman.

Leah, Chris, and JJ Murphy stopped by to visit the Math Department

I live in Niskayuna, NY with my husband Chris Murphy ('06 and head Men's Basketball Coach at Union) and our 3 month old baby John James.

Is a Picture Worth One Good Proof?

In math, one learns the formula giving the sum of a geometric series:

For $|r| < 1$,

$$a + ar + ar^2 + ar^3 + \cdots = \frac{a}{1-r}.$$

Now, this is typically proved by first developing, and proving, the formula for the nth partial sum of the series on the left. (This is a nice Math 199 exercise.)

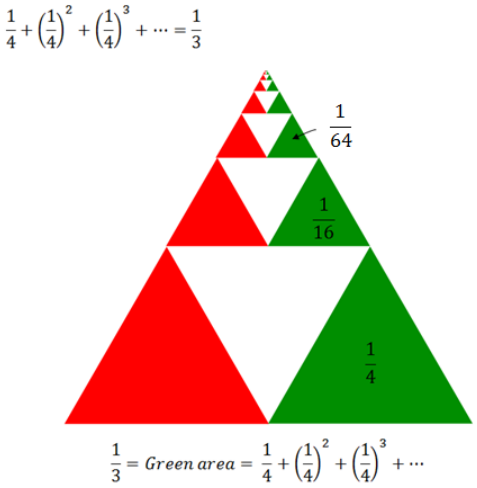
$$S_n = a + ar + ar^2 + \cdots + ar^n = a\frac{1 - r^{n+1}}{1 - r}$$

Then, one proves the result by looking at the limit of the partial sums as $\lim_{n\to\infty} S_n$.

An example of this formula in action, taking $a = 1/4$ and $r = 1/4$ as well, is

$$\frac{1}{4} + \left(\frac{1}{4}\right)^2 + \left(\frac{1}{4}\right)^3 + \cdots = \frac{\frac{1}{4}}{1 - \frac{1}{4}} = \frac{\frac{1}{4}}{\frac{3}{4}} = \frac{1}{3}$$

But, this example formula can also be proved by the following picture! Whaddya think?



Picture from https://vishal12.wordpress.com/2013/05/10/proof-without-words-vii/

REMINDER: The petition acceptance period is Tuesday, 10/23 through Thursday, 10/25.

Problem of the Newsletter – October 22, 2018

Last week's problem: Thank you **Hoang Tran '22** for working on last week's problem. A sample solution has been posted at the newsletter sites in Bailey Hall.

This week's problem: A quickie? Suppose that the positive divisors of an even four-digit number *n* are listed in increasing order as *1, 2, …, n/2, n*. If the number 323 appears on this list, what is the smallest possible divisor of *n* that appear to the right of 323 on this list?

Professor Friedman (friedmap@union.edu) will accept solutions until midnight on Friday, October 26.