

UNDERGRADUATE MATH SEMINAR

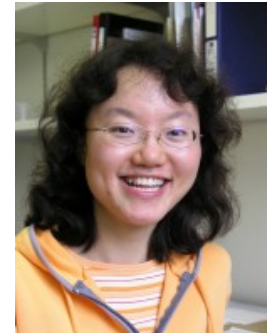
This week's seminar will be back in its usual location

DATE: **Thursday, April 18**

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

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

In this seminar, **Professors Leila Khatami** and **Jue Wang** from the Union College Mathematics Department will lead the following discussion/mini-workshop:



Professors Leila Khatami and Jue Wang

Title: Presenting Mathematics

Abstract: As the Steinmetz symposium approaches, many students are contemplating their presentations and are thinking about ways to make an engaging presentations to effectively share their work with fellow students, family members, and professors. Even those who are not presenting this year, will most probably present their work in the future. In this seminar, we will talk about some of the characteristics of a good mathematics presentation, as well as some of common missteps to avoid. As part of the discussion, we will also watch and analyze a short sample presentation.

My HRUMC Experience, by Khoa Ngo The

This spring break, I spent a whole Saturday at Smith College at the Hudson River Undergraduate Mathematics Conference (HRUMC), where I had one day immersing in mathematics with the voices of other mathematicians. HRUMC is the first math conference that I have ever attended, and, to be honest, I was a little scared that I would not be able to understand the math discussed there. But the enthusiasm of the speakers and the intriguing topics soon wiped away my worries.

This year, HRUMC contained a wide variety of talks ranging from Topology, Number Theory, Statistics, even Arts and Music. From the talks, I was able to learn how Rubik's cubes are used as basis for an encryption system, how the game SET has ideas from mathematical group theory, and something as simple as an alternative method to find the expansion of rational numbers. My favorite talk was about calculating what percentage of triangles are acute, in which the speakers came up with a lot of representations of triangles to calculate the answer, each resulting in different answers, until they eventually settled with the result of 25%.

The conference also had a special invited speaker, Henry Cohn, from Microsoft Research New England in Cambridge, Massachusetts, whose speech was one of the best I have ever seen.

HRUMC was an awesome experience to me. The talks surely inspired me more as a math major, and the conference was extremely professionally held (there was breakfast and lunch too. Professor Paul Friedman and I were quite tired after the long drive and a cup of coffee was an awesome treat). But most of all, I was inspired by the passions that the speakers were able to put into their talks and how they could transform such complex results into understandable talks to deliver to others. Surely, I am really looking forward to next year HRUMC, not just as a participant, but as a speaker who will deliver talks as I have been able to see in this year's wonderful conference.

Pieces from Theses, by Diron Kelly Jr.

Diron's thesis was supervised by Professor Kim Plofker

During the winter term I had the opportunity of completing my senior thesis under the advising of Professor Kim Plofker. It was a challenging, yet enjoyable experience. The topic for my thesis was the development of the calculus of variations. The calculus of variations is a field of mathematical analysis that uses variations, which are small changes in functions and functionals, to find the path, curve, or surface for which a given function has a stationary value. These stationary values appear when the variations produce zero change and thus a maximum or minimum value is reached. To find these stationary values we must solve integrals of the form:

$$I = \int_a^b f(x, y(x), y'(x)) dx.$$

This integral I has a maximum or minimum only if the Euler-Lagrange differential equation is satisfied, meaning

$$\frac{\partial f}{\partial y} - \frac{d}{dx} \frac{\partial f}{\partial y'} = 0.$$

In my thesis I explored how these two important equations were derived and the methods used by the mathematicians who derived them. The two mathematicians I talked about were Leonhard Euler and Joseph-Louis Lagrange. Their methods differed because Euler was fond upon the use of a geometric approach whereas Lagrange took a more variational approach, hence the name calculus of variations. Understanding and interpreting these methods was where I experienced the most difficulty during my journey toward completion. Having to research intensively, understand thoroughly, write and edit in span of 10 weeks can really take a toll on the brain, especially when looking at the works of brilliant minds such as Euler and Lagrange. Nevertheless, having the support and encouragement of my thesis advisor and her timely availability to clarify and make sense out of my research played a major role in helping me complete my thesis. But, in terms of advice for underclassmen that are looking forward to completing a senior thesis, I would encourage them to create a detailed schedule delegating time to work on thesis, utilize their thesis advisor as much as they can, while being mindful of their schedules, and be sure to write about something that really grasp their interest. It makes the process a lot more enjoyable.

Problem(s) of the Newsletter – April 15, 2019

Last week's problem: Congratulations to **Khoa Ngo The** for submitting a correct solution to last week's problem. You may view solutions to the problem at the newsletter sites in Bailey Hall.

This week's problem: Let x and y be positive integers that satisfy the equations

$$\begin{aligned} \log_{10} x + 2 \log_{10}(\gcd(x, y)) &= 60 \\ \log_{10} y + 2 \log_{10}(\text{lcm}(x, y)) &= 570 \end{aligned}$$

Let m and n be the number of (not necessarily distinct) prime factors in the prime factorization of x and y , respectively. Find $3m+2n$.

Professor Friedman (friedmap@union.edu) will accept solutions until midnight Friday, April 19.