

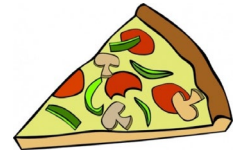
## UNDERGRADUATE MATH SEMINAR

This week's seminar will continue with Union student speakers giving talks about their math-related summer research projects. Three students are on the schedule this week, and their abstracts are below. The seminar is returning to Thursday this week, where it will be for most of the fall term. And there will be pizza beforehand!

**DATE:** **Thursday, September 26**

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

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



### Meichai Chen '20: Weak Orders and Utility Functions

**Abstract:** A weak order is a complete and transitive order on a set  $X$ , whose elements we refer to as preferences. In this talk, we will explore the connections between weak orders and utility functions. We will then briefly discuss how weak orders and utility functions arise in expected utility theory and prospect theory, and conclude with a short description of how these concepts are used in a study regarding stereotype threat.

### Herschel Norwitz '21: Distinguishing Between Forced and Natural Oscillations on the Power Grid

**Abstract:** Oscillations are always occurring on the grid. The two forms of oscillations that occur are natural and forced. Observing natural oscillations can tell the health of the system. Unfortunately forced oscillations occur that don't affect the health of the system, but can make it appear as though the system is unhealthy.

In this research a dynamometer and a DC motor were used to inject forced oscillations into the outlet. Then using Matlab and a python program, measurements are taken from an outlet so see if it is not only possible to observe the oscillations but distinguish them.

### Mushan Zhong '20: Use of Nonlinear Models in Analyzing Experiments with Both Mixture and Process Variables

**Abstract:** When conducting statistics experiments, in most cases we can experiment with different combinations of variables without restrictions. While there are some other cases in which the experimental variables are ingredients, and must sum to 100%. These are called mixture variables.

Our research focused on how to approach problems with both process and also mixture variables. We tested different models to see how well they could fit a given set of data, as well as how well they predicted new data. The objective was to develop models that can be applied to smaller data sets, which would allow researchers to run smaller, cheaper, and faster experiments.

### Class of 2019: Stay in Touch

Union College email accounts of recent graduates expire at the end of September. To continue receiving the Math Newsletter, please update your email address with **Joanne Higgins** ([higginsj@union.edu](mailto:higginsj@union.edu)) or **Professor Paul Friedman** ([friedmap@union.edu](mailto:friedmap@union.edu)).

## Putnam Exam Preparation to Begin Wednesday, September 25

Do you enjoy problem solving in math? Would you like to participate in a nationwide collegiate problem-solving competition? If your answer to these questions is yes, then please consider attending the first meeting of the **Putnam Exam Preparation Squad** - yes, a math PEP squad!

When: **Wednesday, September 25** from **1:00 - 1:45pm**

Where: **Bailey 106**

If you can't attend this meeting but are interested in finding out more about the Putnam Exam, please contact **Professor Ehssan Khanmohammadi** (Bailey 108B, [khanmohe@union.edu](mailto:khanmohe@union.edu)) or **Professor Jay Klangwang** (Bailey 108D, [klangwaj@union.edu](mailto:klangwaj@union.edu)).

## Join the Club(s)! Math Club and AWM Meetings this Week

Two student run math organizations are having their initial meetings this week in good old Bailey Hall. If you would like to meet and get involved in activities with students interested in math, this is a great way to do so.

- **Math Club:** Math Club is starting up again for the year- feel free to stop by the **math common room at 1 pm on Friday, September 27** to join in. Everyone is welcome!
- **Association for Women in Mathematics (AWM):** The Union College chapter of AWM will be having its first meeting of the term **Wednesday, September 25 at common lunch, 1 pm**, in the **math common room**. We will also be holding elections, so if you would like to run for a position send a short blurb to Kallan Piconi ([piconik@union.edu](mailto:piconik@union.edu)) explaining why you would like to have a greater role in the club!



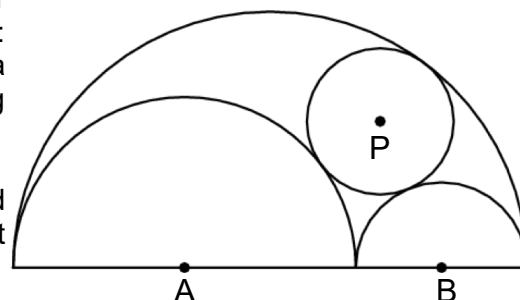
Lily Dong and Kallan Piconi representing the Math Club and AWM at the Club Expo

## Problem of the Newsletter – September 23, 2019

In most issues of the newsletter, we present a “Problem of the Newsletter.” While the problems will range in difficulty and in their prerequisites, we hope they will have at least one thing in common: they are fun to work on! And, if you submit a correct solution to a problem, you will receive public honor via recognition in the following week’s newsletter. Get ready. Get set. Have fun!

**This week’s problem:** This summer, a local retired teacher stopped by the math department to ask a question that we will take as our first problem of the academic year.

As shown, semicircles with centers at A and B and with radii 2 and 1, respectively, are drawn in the interior of, and sharing bases with, another semicircle. The two smaller semicircles are externally tangent to each other and internally tangent to the largest semicircle. A circle centered at P is drawn externally tangent to the two smaller semicircles and internally tangent to the largest semicircle. What is the radius of the circle centered at P?



**Professor Friedman** ([friedmap@union.edu](mailto:friedmap@union.edu)) will accept solutions until noon on Friday, September 27.