UNDERGRADUATE MATH SEMINAR

This week's seminar is the final seminar of the term:

DATE: <mark>**THURSDAY, May 30**</mark>

Time &   **12:30 –** Refreshements in **Bailey 204**

Location: **12:50 – 1:45** Movie in **Bailey 207**

Title: Odd Numbers, Square Numbers, and Pythagorean Triples

Professor Karl Zimmermann

Abstract: In this talk, we explore the relationship between odd numbers, square numbers, and Pythagorean triples (positive integer solutions to the equation $x^2 + y^2 = z^2$). We begin by using the sequence of odd numbers to explain certain patterns in the sequence of square numbers. Along the way, we see examples of Pythagorean triples arising naturally in the sequence of squares and use some of these triples to provide intuition as to why every odd integer greater than one is the leg of a Pythagorean triangle. After a hint at how to classify Pythagorean triples using the sequence of odd numbers, we look at how these ideas might be applied to the study of positive integer solutions, or lack of solutions, to the Fermat equation, $x^n + y^n = z^n$, for $n = 3$.

Yuqiao Yuan Class of 2014 Checks In!

A full decade has passed since my graduation from Union, and I'm grateful for the opportunity provided by **Professor Emeritus Julius Barbanel** and **Professor Paul Friedman** to pause, reflect, and reminisce. Among the many memories that come flooding back, one that is most powerful comes from my freshman year when I received an email from **Professor Kimmo Rosenthal**, now Professor Emeritus Rosenthal. It was a surprising and pivotal moment. Mathematics had never been my strong suit, yet Professor Rosenthal took notice of my potential. His suggestion that I consider majoring in math caught me off guard. I was an international student adapting to a foreign environment, language, and culture – all of which posed significant challenges. I never imagined someone would pay such close attention to my academic journey. It was at Union, under the guidance of a group of amazing math professors, that I discovered a newfound appreciation for the subject. Before long, I found myself declaring math as my major, and of course, Professor Rosenthal became my advisor.

Fast forward ten years, I now stand as a credentialed actuary with the Society of Actuaries. Currently, I serve as the Assistant Vice President of Research Data Services at LIMRA, the largest trade association that for over a century has supported the insurance and financial services industry. I lead a data analytics team, overseeing data collection, validation, analysis, predictive modeling, visualization, and modernization initiatives. Reflecting on this journey, I owe so much to the nurturing and education I received at Union. When Professor Rosenthal became my advisor, I shared my ambitious plan to double minor in economics and dance alongside my major in math, with the even more ambitious plan of graduating within three years. Despite the challenge, Professor Rosenthal not only respected my resolve, but also provided unwavering support throughout the journey. His mentorship transcended conventional academic guidance, fostering immersive experiences across disciplines that enriched my journey as an international student.

From delving into Python programming within the computer science department, to showcasing traditional Chinese folk dance at the Union winter dance concert, my journey at Union was rich with diverse experiences. Whether exploring the intricacies of linear algebra and differential equations with **Professor Zwicker** and **Professor Wang**, collaborating with Professor Dvorak from the economics department on pension plans during summer break, or participating in two winter mini-terms in New Orleans and New Zealand, the

opportunities offered by Union helped me to broaden my horizons. Under the mentorship of Professor Hoerl, I studied regression analysis, which served as the cornerstone of my senior thesis on big data analytics. It was through this hands-on experience that I truly grasped the practical application of mathematical concepts.

With the support of my exceptional professors at Union, I achieved my academic goals. By my junior year, I had accumulated enough credits and studied hard enough to graduate magna cum laude – a feat made possible by the guidance and mentorship of my professors. Because of Union's investment in my growth, I was offered an internship at IBM research lab where I encountered real-world data analytics challenges for the first time. I also earned admission to Columbia University for a master's program and officially started my actuarial education in the fall of 2014. I want to express my gratitude to the professors who wrote recommendation letters for both the IBM internship and Columbia University admission. These experiences cemented my trajectory at the intersection of actuarial science and data science within the insurance industry.

For those who may not be aware, the path to becoming an actuary is rigorous, marked by challenging exams with low passing rates. My journey, however, began with a stroke of luck – my first actuarial exam tested my knowledge in probability. This is a subject I had previously studied under the tutelage of Professor Barbanel during my final spring term at Union. Professor Barbanel's probability class not only provided me with a solid foundation in probability theory, but also instilled in me a deep appreciation for the subject. What set this class apart was Professor Barbanel's kindness and curiosity, exemplified by a bonus question on our final exam: "What is your birthday?" Professor Barbanel mentioned that he was interested in the probability of his students sharing the same birthday; however, I completely missed this question on the exam day. Professor Barbanel gave me another chance by sending me a follow-up email. Since then, he has made it a point to wish me a happy birthday every year – a small gesture that speaks volumes about his dedication to his students.

I was never a math genius. It was the genuine care and commitment of Union's math professors, like Professor Barbanel and Professor Rosenthal, that fostered my love for mathematics and set me on the path to success. Over the past decade, mathematics has brought me more than just academic and professional fulfillment – It was at Union where I met my best friend, who, like me, pursued a major in math and later attended Columbia University. It was also through mathematics that I found a mentor in my workplace – an actuary who has played a critical role in my career advancement. Moreover, math introduced me to the love of my life – my fiancé, also an actuary, who shares my passion for numbers and problem-solving. As we venture into the next decade, embracing anticipated and unforeseen challenges both in our personal and professional lives, I'm grateful for the empowering skills mathematics has bestowed upon me – identify the problem and solve the problem! I am equally grateful for Union College and its stellar faculty who have been pivotal in ensuring my growth from student to graduate student to professional. My journey is a testament to the transformative power of exceptional educators and the profound impact they have on their students' lives.

Fall Term Job Opportunities: Calculus Help Center Tutor; Math Coach for MTH 105

The Math Department, as well as The Office for Student Success, will be hiring students to help their peers learn and succeed in studying calculus. There are open tutoring positions for the upcoming fall term to work in the Calculus Help Center, and also to become a Math Coach for Math 105.

CALCULUS HELP CENTER TUTOR. Tutors in the CHC one fixed night per week, Sunday through Thursday, 7:30-10:00pm. Qualifications: Calculus through Math 115 with grades no less than A-. To apply, send an email to **Professor Paul Friedman** (friedmap@union.edu) expressing your interest, listing your mathematical background, including coursework (term, professor, and grade) and tutoring experience (if any), and discussing why you think you would be a good tutor. **Application deadline: Friday, May 31 at NOON.**

MATH COACH for MATH 105. Math Coaches attend and work with a section of MTH 105. They assist the professor during class, circulating and working with students when the students are working on problems and worksheets. In addition, the group of Math Coaches provide specialized math help sessions for the Math 105 students. Lesly Clay (clayl@union.edu), the Director of the Office of Student Success, will be soliciting applications for Math Coach positions soon! Please be on the lookout for such notices.