

UNDERGRADUATE MATHEMATICS SEMINAR

Bookmark it! The seminar schedule, abstracts, and (sometimes) slides presented by a speaker can be found on a webpage maintained by **Professor Jue Wang**: <http://www.math.union.edu/~wangj/seminar09w.htm>

The first seminar of the winter term will be:

DATE: **TUESDAY, January 13th**

Time & **3:45pm** – Refreshments in the Math Common Room, **Bailey 204**

Location: **4:00pm** – Seminar in **Bailey 207**

In this seminar, **Professor Edward Sandifer**, from Western Connecticut State University will deliver the following talk:

TITLE: Many roads, one destination: Three proofs of the Euler identity

ABSTRACT: Some people regard the Euler identity, $e^{i\theta} = \cos\theta + i\sin\theta$ as the most beautiful result in all of mathematics. There are many proofs of this result. We will give three of them, Euler's proof of 1748, the one Lagrange favored in 1797, and Cauchy's ingenious proof of 1821, and we will see how the different ideas behind their proofs reflected changes in what people expected mathematics to be and to do.

Pieces from Theses: A View from **Kate Colantuono** ('09)

At first, the thought of writing a thesis was a daunting one, having to find something of interest and with enough information to write about from such a general topic. On top of this, it was going to be the first time in which I was going to work mostly independently, with little help from my advisor and without the help of my fellow students. This idea that I had in my head was far worse than what my experience was in reality.

For my fall term mathematics senior thesis, advised by Professor Susan Niefeld, I was given the topic of Irrational Numbers and had to choose some element of that topic to discuss that would cover a 20-page thesis. At first, I was extremely overwhelmed by everything I had to do, having no idea what direction I wanted my thesis to go in. I acquired numerous amounts of books from the library on the general topic of irrational numbers, read through them and took notes. The library was a great resource, supplying me with all of the books I needed to complete my thesis. After taking my first set of notes and meeting with my advisor for the second time in the first week, I was still clueless as to what I wanted to write about, and I began to fret.

Then, all of the sudden, I found the most perfect topic that I could have imagined; the golden ratio, also often referred to by the Greek letter phi. The golden ratio appears in most concepts of mathematics, as well as in things that have no correlation at all to math, such as art. So having a mathematics major with a minor in visual arts, this subject especially peaked my interest and was something I was excited to explore and discuss. I was elated to pick a topic so early, yet I was still a bit worried that my information would not cover the amount of pages I needed to complete my thesis. Prof. Niefeld believed otherwise. After obtaining more books from the library, specifically pertaining to this topic, I was able to research the different subtopics of the golden ratio with ease. The ideas that I chose to include were background and proofs on irrational numbers, the golden ratio as found in art and geometry along with proofs, and phi as seen in the Fibonacci sequence.

A few weeks into the term, after taking pages of notes and doing proofs, as well as making a tentative outline for what my thesis would look like, it was time to begin writing. My advisor suggested that

I type my thesis in LaTeX, which is a computer program used by many mathematicians to achieve a high quality of typesetting. I was leery of the idea of having to learn a new computer program in addition to writing out my whole thesis, not being so good with computers, so I began to type with the program I was most comfortable with, which was Word. I was on a roll typing, but whenever it came to entering equations, mathematical symbols or proofs, it was a hassle and rarely came out in a presentable fashion. Though still a bit nervous, I finally decided to make the switch. It was definitely the best decision I could have made. Though it took me a little getting used to, I got the computer language down in no time, and it made my writing go so much faster. I am so happy that Prof. Niefield suggested that I use this program for I think it was the best thing I got out of this experience. My final product looked like it was straight out of a textbook, and best of all, LaTeX was so fun for me to work with. I strongly advise any student doing a mathematics thesis to use this program. By the end of the tenth week, I had more than enough information in my paper, just like my advisor said I would, and I was so excited about my final product and its presentation.

My thesis, though interesting and very fun, took up a lot of time, discipline and organization. I met twice a week with my advisor, supplying her with notes and proofs of mine that would all possibly contribute to my final product, and in the last few weeks showing her parts of my final paper. It was very stressful at times, but you cannot get bogged down. It is crucial while writing your thesis that one does not procrastinate, for it will only make it harder for you in the end. By handing things in twice a week and getting feedback and help right away, it gave me a clearer direction of my paper that I was easily able to put together in the end.

Senior thesis offered me an experience to try and learn new things, and also to develop a great relationship with my advisor. Prof. Niefield helped me with my work in so many ways, and I cannot thank her enough. The outcome was a thesis and experience that I could not be any more proud of. Thesis is something that everyone has to look forward to and should take full advantage of. I would give anything to do something like this again. The best advice that I have to offer is to try new things, write on something of interest, and to most of all, have fun!

Enough with the Ice Storms! Start Thinking about your Summer Plans!!

The National Science Foundation (NSF) sponsors many Research Experience for Undergraduates (REUs) in mathematics at colleges and universities throughout the country. These are summer programs that last 6-8 weeks where undergraduates are given the opportunity to perform some mathematical research – and get paid for it!

Almost every summer, some Union students participate in an REU. If you are interested, you should start planning soon as most application deadlines are in February-March.

For a current list of programs, go to <http://www.ams.org/employment/reu.html>. As the math department receives bulletins and emails announcing the REUs, we will post the information on the bulletin boards around Bailey Hall, and advertise some of them in the newsletter.

**The Calculus Help Center is Open Sunday - Thursday, 7:30-10:00 pm
in Sorum House**

Problem of the Newsletter: January 9, 2009

Here is this week's problem (from a University of Rochester contest): Let A be a point on the curve $y = x^3$, different from the origin. The tangent line to the curve at point A intersects the curve at another point B ($\neq A$). Prove that the ratio of the slopes for the tangent lines to the curve at points A and B is constant (i.e. doesn't depend on point A).

Professor Friedman will accept solutions to this problem until 12:00 noon Thursday, January 15th. Email your solution to him (friedmap@union.edu) or put it in his mailbox in the Math Department's office on the second floor of Bailey Hall.