Department of Mathematics January 26, 2007

UNDERGRADUATE MATHEMATICS SEMINAR

The next meeting of the seminar will be this coming Monday **January 26,** with refreshments beginning at 4:45 in the Math Commons Room, Bailey 204, and the lecture following at 5:00 in Bailey 201.

In this week's seminar, ***Professor Johnson*** will present the following talk:

TITLE: A Partition Sampler

ABSTRACT: A partition of a natural number n is a list of natural numbers whose sum is n. The number of partitions of n is denoted p(n). For example, the partitions of 3 are {1,1,1}, {1,2}, and {3}, so p(3)=3. The function p has been studied for centuries. I'll discuss some of the interesting mathematics that has resulted from the study of this seemingly simple function.

This talk is based on thesis work with Jessica DiMarco.

Pieces from Theses: A View from **Giselle Parrelli** ('07)

If asked to mention the names of people who have contributed to the history of mathematics chances are that the names said are those of the male gender. However, there are many women who overcame prejudicial obstacles and have contributed a great deal to this field. For my senior thesis, I investigated several of these women and chose to write my thesis on the woman I found most interesting, Marie-Sophie Germain (1776-1831). While Fermat's Last Theorem was not proven until recently in 1995, Sophie Germain created a theorem, Germain's Theorem, which was the largest advancement of this proof of her time. In my thesis, I looked at the obstacles she had to overcome, her work, and looked at her proof of her theorem.

Sophie's parents were unable to understand her desire to learn mathematics and were afraid that others would think she was mentally ill for wanting to study it. In order to prevent Sophie from studying and learning, her parents deprived her of light and heat and also took her clothing away from her after she turned in for the night in the hopes that she would be too cold to get out of bed. Sophie would not let her parents stop her from pursuing her passion and so after her family was asleep, she would wrap herself in her blanket and study by candlelight from candles she secretly hid from her parents. Sophie's parents would continually find her asleep at her desk. Concerned for her health, her parents finally allowed her to study.

Sophie's parents hired tutors to help her but these tutors would not challenge her. They possessed the frame of mind that since Sophie was a woman, she as unable to learn the more advanced areas of mathematics, and would therefore "challenge" her with simple problems. She managed to come into contact with mathematicians such as Joseph Louise Lagrange, Adrien-Marie Legendre, and Carl Friedrich Gauss, who were, for unknown reasons, also unable to give her the training she deserved. They did, however, encourage her to continue on with her work as well as comment on her findings. Thus, Sophie was unable to attain any proficient instruction, which resulted in her being, for the most part, self-taught.

During Sophie's study of number theory, she came across a French mathematician, Pierre de Fermat, and his many theorems. The one that caught her attention the most was Fermat's Last Theorem. Sophie had become so fascinated with this particular theorem because it had not been proven

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yet and many great mathematicians before Sophie had attempted to prove it but were unable to. Sophie first proved the theorem for the case $n = p - 1$, where p is a prime number of the form $8k + 7$. After proving this single case, Sophie strived to create a proof in which not just a single case was proven but rather a single proof that would prove multiple cases. In order to do so, Sophie focused on a specific type of prime p. These primes became known as Germain Primes. Sophie then proved Fermat's Last Theorem for the Germain Prime $p = 5$ and, in 1820 after she began improving her work, she developed her most famous theorem that has become known as Germain's Theorem. This theorem states that if p is a prime such that $q = 2p + 1$ is prime, then $x^p + y^p = z^p$ has no solution when p does not divide xyz. This theorem was the most significant breakthrough to solving the proof of her time and no one else progressed on the proof until 1840.

Prior to beginning my thesis, I was extremely nervous about what the experience would be like, especially since I do not consider myself an experienced writer. However, with the help of my thesis advisor I was able to learn how to articulate my thoughts and become a better writer. I soon learned that there was nothing to be nervous about since my advisor was there to help with anything I found troublesome.

For those of you that will be writing your thesis next year my number one suggestion would be to choose a topic that you find interesting. Countless hours will be spent researching and working on this topic, so if you are working on a topic that you do not find interesting your thesis experience will not be as good. Also, since you will be working with your advisor a lot, I suggest trying to work with a Professor that you know and are comfortable working with. My final suggestion would be to make your own due dates for different sections and stick to them. It is best to finish your first complete draft early so that you may spend a lot of time proof reading and revising. There were many stressful times, but overall, my experience writing a thesis was one that I will never forget and I know yours will be too. Good luck!

Problem of the Newsletter: January 26, 2007

Congratulations to **Schuyler Smith**, winner of last week's Problem of the Newsletter contest. You can view the winning solution on the first floor bulletin board in Bailey Hall.

Here is this week's problem: Three students play a game in which the (one) loser is to double the money of the other two. After three games each has student has lost just once, and each ends up with $24. With how much money did each student start?

Professor Friedman will accept solutions to this problem until 12:00 noon Thursday, February 1.