

## UNDERGRADUATE MATHEMATICS SEMINAR

The next meeting of the seminar will be this coming **Monday, January 22**, with refreshments beginning at **4:45** in the Math Commons Room, **Bailey 204**, and the lecture following at **5:00** in **Bailey 201**.

Due to inclement weather, last week's seminar was postponed. Weather permitting (!), **Professor Barbanel** will present the following talk:

**TITLE: Irrational Numbers: discovery, crisis, and resolution**

**Abstract:** Pythagoras and his followers (who lived and worked about 2500 years ago) thought it obvious that any two line segments are commensurable, or, in other words, that given any two line segments, there is some third line segment that measures each. This assumption turns out to be equivalent to the statement "all real numbers are rational." Many ancient Greek geometric proofs used this assumption. When it was discovered that this assumption is false, it caused a major mathematical crisis. We shall explore the reasons why the Pythagoreans made this commensurability assumption, the discovery that it is false, the ensuing mathematical crisis, and the resolution of this crisis by Eudoxus.

## Summer Planning: It Is Not Too Soon (Or Too Late) to Begin

As you are enjoying the single digit weather in Schenectady, your thoughts might drift to warmer times and the upcoming summer. Since we know you are enjoying your math courses, and if are intrigued by the idea of research in mathematics, and/or are considering pursuing a higher degree in math after Union College, you might want to consider participating in a **Research Experience for Undergraduates** (REU) Summer Program in mathematics.

"But I need to get a job and earn money this summer," you might be thinking. Well, students who participate in an REU receive a stipend, usually on the order of \$3000 for a six- or eight-week program, some support for travel to and from the program, and often even receive room and board – all depending on the particular program.

"Sounds great, but am I eligible?" you might

now be asking. Most programs are open to US citizen or permanent resident students who have completed their sophomore or junior year, their (multivariable) calculus sequence, have experience with proof-writing courses, for example, a post-Math 199 course, and have strong academic record.

There are REUs for almost all interests: algebra, applied math, geometry, graph theory, knot theory, topology .... Some are specifically oriented for women, and some strongly encourage minority applicants. For a list of this summer's REU programs and links to their descriptions, go to <http://www.ams.org/employment/reu.html>. In the recent past, Union students have participated in the REU at George Washington University and the REU at SUNY Potsdam/Clarkson.

"Sign me up!" Hold on. There is an (cont. p2)



(competitive) application process. You will likely need to write a personal statement and to secure letters of recommendation. Most application deadlines are in

February or March. So, if you are interested learning new math and experiencing mathematical research firsthand, you should get the ball rolling ... soon!

Do you have any ideas for future newsletters?

E-Mail:  
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## Relevant Related Rates: Sliding Ladders Helped Prominent Mathematician Land First Engineering Job.

The January 2007 issue of Notices of the AMS contains an interesting interview with Professor Joan Birman, a topologist and Research Professor Emeritus at Barnard College, Columbia University. In the interview, Professor Birman explains how, after college and before graduate school, an engineering firm that manufactured microwave frequency meters hired her in part because during her interview she discussed how

about ladders sliding against a wall and ... that the curve that gave the height of the ladder as a function of its distance from the wall might be a curve that could be fitted to the experimental data”

and could be used to solve a dial calibration issue.

A more complete excerpt is posted on the first floor bulletin board in Bailey Hall, and the complete interview can be found in the issues of Notices in the Math Commons Room.

“[I]n calculus, [she] had learned

### We're on the Web!

See us at:  
<http://www.math.union.edu>

under “Department Activities”

## Resources for Students

- WebWork Woes? Don't just email your professor in desperation – go and actively seek *free* tutoring in the Calculus Help Center (CHC). The CHC is open five nights a week, Sunday – Thursday from 7:30 -

10:00pm. It is staffed by experienced, kind, and helpful upperclassmen and it services all calculus courses through Math 115. You can find the CHC in the seminar room of Sorum House.

## Problem of the Newsletter: January 19, 2007

Unfortunately, there were no correct solutions submitted answering last week's Problem of the Newsletter. You can view a solution on the first floor bulletin board in Bailey Hall.

**Here is this week's problem:** Using the digits 1, 2, 3, 4, 5, each exactly once, one can form 120 different five-digit numbers. What is the sum of these numbers?

Professor Friedman will accept solutions to this problem until 12:00 noon Thursday, January 25, 2007. Please put your solution in his mailbox in the Math Department's office on the second floor of Bailey Hall. Be sure to include your email address with your submission. The student who solves (correctly!) the most PONs will receive a one-year student membership into the Mathematical Association of America, courtesy of the Math Department!