Department of Mathematics October 13, 2006

UNDERGRADUATE MATHEMATICS SEMINAR

The next meeting of the seminar will be this coming **Monday, October 16**, in Bailey 312 beginning at 7:00. Before the seminar, people might want to discuss their approaches and solutions (!) to the Putnam Exam Practice Problems distributed last week. As usual, fresh cider and donuts will be provided.

In this week's seminar, Professor Bill Zwicker will present the following talk:

TITLE: **Grades, ★s, and ,s**

ABSTRACT: You are a professor, and you are planning to teach a course. There will be 3 tests, each graded on a scale from 1 to 5, with 5 as the highest possible grade and no fractional grades allowed. You want each test to be equally important in deciding a student's final course grade, for which there are only two possibilities: ***Pass*** and ***Fail***. Finally, you don't want the system to be "perverse" – if you realize you made an error, and as a result you *raise* one of Sara's test grades, her final course grade should never switch from Pass to Fail as a result. Here are a few possible grading systems:

- Everyone passes, regardless of his or her test grades [(1)].
- Everyone fails, regardless of his or her grades.
- You pass if and only if your average test score is 3 or higher.
- You pass if and only if your median test score is 3 or higher.

How many other possibilities can you think of?

The table below gives the number of possible Pass-Fail grading systems when there are n tests, each graded on a scale from 1 to j. (We were using n = 3, j = 5, above.)

What interesting patterns can you find in the table?

We'll extend a standard method in finite combinatorics to confirm what may be the most surprising of these patterns. If time permits, we'll explain the connections between these grading systems and the theory of voting with abstention.

[(1)] This Professor is probably ***not*** in the Mathematics Department.

j\n	*2*	*3*	*4*	*5*	*6*	*7*
2	4	5	6	7	8	9
3	8	16	32	64	128	256
4	16	66	352	2431	21760	252586
5	32	**352**	9304	683464	161960220	
6	64	2431	683464			
7	128	21760	161960220			
8	256	252586				

Winter Term Scheduling

This winter term, the Mathematics Department is offering several interesting courses beyond the calculus sequence that are suitable for math majors and minors.

Math 128 is a calculus-based introduction to probability. Students who might be interested in a career as an actuary or in financial mathematics should consider this course. This course is also useful for prospective teachers.

Math 130 is a course in ordinary differential equations. This course is required for majors and minors in applied mathematics and has a Math 115 prerequisite.

Math 199 is the department's "bridge course," intended to help students make the transition from computationally oriented courses to more theoretical proof-writing courses. As such, it carries WAC credit. Further, it is requirement for all math majors and minors. Math 199 is *usually* taken after a student has taken Math 115.

There are three courses being offered this winter that have a Math 199 prerequisite: Math 224 (Geometry), Math 340 (Linear Algebra), and Math 448 (Differential Geometry). As a Level 1 course, Math 224 is appropriate for students coming from Math 199. It is also a wonderful choice for students with an interest in becoming a teacher. Math 340 is a Level 2 course and is required for the applied math and standard math majors. Math 448 is a Level 3 course and is a good choice, particularly for students who wish to earn departmental honors and/or have interest in graduate school.

Each of the courses described above are petition (card) courses. You can sign-up on the web (http://www.math.union.edu/) for a card on Wednesday or Thursday (18th, 19th). Results will be posted at the beginning of the following week.

Where Are They Now? By Stephanie Conklin '05

Two years ago, as a senior math major at Union, my life revolved around math tests, trips to Upper, weekend festivities and gym trips; now, my life revolves around writing math tests, handling adolescent mood swings, passing out on the weekend and making half-hearted attempts to go to the gym. Although my current life as high school math teacher in a Boston Public School is dramatically different then it was two years ago, I find that my experiences at Union fundamentally shaped my desire to teach math to urban youth and to create positive change in our country.

While at Union, I realized that I wanted to have a job where I could use math everyday and also work directly with people. Through the recommendation of a friend, I began to volunteer at the Kenney Community Center and realized the positive influence I had on the students. Moreover, I realized that working with students who faced additional challenges in their lives, like poverty and disabilities, made my work seem more purposeful. Thus, during my senior year at Union, I began to apply to a host of graduate schools in education. My hard work at Union and wonderful recommendation letters (thank you, Professors Taylor and Tønnesen-Friedman!) paid off when I accepted an offer to pursue graduate study at Harvard University's School of Education.

During my year at Harvard, I did my student teaching in an urban high school in Boston Public Schools with recent Latin American immigrants. It was a challenge to teach these students both English and math … ¿Como se dice square root? However, I really enjoyed learning about the Hispanic culture and teaching my students about American lifestyles. In addition to my student teaching, my academic courses at were all quite interesting – even though they were not math courses as I fulfilled my math requirements while at Union.

As graduation from Harvard approached, I interviewed in Boston Public Schools for a job as a mathematics teacher at the high school level. The teachers and principals who interviewed me were extremely impressed with my mathematics major from Union College. Many of these interviewers challenged me on my abilities to teach upper-level courses like, BC Calculus or Advanced Placement Statistics; however, with my strong math background I felt wholly confident in my skills. My confidence must have shown because I received a multitude of offers, and finally received an offer at the school I wanted to teach at the most.

This year, I am teaching ninth, tenth and eleventh graders, both algebra and geometry. It is amazing how much the curriculum of basic algebra relates to some of the math classes I took at Union and, yet, how differently my perspective has changed. For example, in my class today, we discussed the union and intersection of sets of numbers and I can remember my notes from Introduction to Set & Logic Theory covering the same topic. However, instead of looking up at a professor, I found myself looking down at 25 antsy and hungry fourteen year-olds. It is at moments like these that I wonder if all of my hard work studying and doing problem sets was worth it. Then, I remember that my love of mathematics took formation amidst those hours of work and, most importantly, that my students now have a mathematics teacher who loves math, and also loves what she does. Teaching is definitely hard work, but rewarding! Take advantage of the opportunities you have at Union …and take a Spanish class or two, if you can.

If you are interested in teaching please email me at sconklin@boston.k12.ma.us, I would love to help in anyway I can. Best of luck!

Resources for Students

- Math for Fun! The Albany Area Math Circle is a group of mostly high school students who meet to work together on interesting and challenging math problems for three hours each week from October through May. The group welcomes college students to join in their meetings - even though they are not eligible for the official contests in which the group participates, they are certainly welcome to join in the fun and camaraderie of working together. For more information, contact Mary O'Keeffe at mathcircle@gmail.com.

Problem of the Newsletter:

October 13, 2006

Congratulations to **Schuyler Smith**, winner of last week's Problem of the Newsletter contest.

Here is this week's problem: Determine, with explanation, the real number to which the "infinite fraction"

$$2+\cfrac{1}{2+\cfrac{1}{2+\cfrac{1}{2+\ddots}}}$$ converges.

Professor Friedman will accept solutions to this problem until 12:00 noon Thursday, October 19.