

UNDERGRADUATE MATHEMATICS SEMINAR

No seminar during this last week of classes or during finals week.

The seminar will resume next term – see you then!

The Mathematical Contest in Modeling 2008: An Overview

Over a long weekend in February, from 8pm on Thursday February 14th through 8pm on Monday, February 18th, Union College fielded a team of three students in the annual Mathematical Contest in Modeling (MCM): Shawn Bartok '08, Richie Bonventre '08, a math and physics major, and Steven Neier '11 an undeclared, but potential, math major. In the MCM, undergraduate teams from colleges and universities around the world are given two “real world” problems, select one, and then spend an extended weekend developing a solution and writing a paper justifying their solution. After submitting their paper, a panel of math professors (including our very own Professor Black) judges and rates the solutions.

The problems in this year's contest were:

PROBLEM A: Take a Bath

Consider the effects on land from the melting of the north polar ice cap due to the predicted increase in global temperatures. Specifically,

model the effects on the coast of Florida every ten years for the next 50 years due to the melting, with particular attention given to large metropolitan areas. Propose appropriate responses to deal with this. A careful discussion of the data used is an important part of the answer.

PROBLEM B: Creating Sudoku Puzzles

Develop an algorithm to construct Sudoku puzzles of varying difficulty. Develop metrics to define a difficulty level. The algorithm and metrics should be extensible to a varying number of difficulty levels. You should illustrate the algorithm with at least 4 difficulty levels. Your algorithm should guarantee a unique solution. Analyze the complexity of your algorithm. Your objective should be to minimize the complexity of the algorithm and meet the above requirements.

Interesting problems! Which would you choose? How would you devise your solution?

MCM 2008: The Aftermath, by Steven Neier '11

As this is my first year in college, my initial goal was to simply survive. Between living on my own and all of my classes, I was unsure if I was going to see my first semester through. However, after talking to my advisor and first semester IMP professor, Kelly Black, I learned about MCM. I was hesitant as to what this competition entailed, but after talking with

seniors Shawn Bartok and Richard Bonventre I decided that MCM would be a privilege and an enjoyable experience. After deciding to participate in the MCM, my teammates and I met a few times before the competition with Professors Black and Wang to prepare ourselves for the event. (continued.)

On Thursday night, after the contest problems were revealed online, we students gathered and discussed our initial reactions to the problem. All of our reactions were that the problem concerning Sudoku would be less challenging and more straightforward, but it would require extensive programming. The problem examining sea level rise in Florida appeared to encompass a myriad of simple factors combined into an extensive problem. We researched for the next few hours exploring both possibilities.

Friday was mainly spent researching and discussing both problems. We spent numerous hours examining Sudoku codes and evaluating potential sea level rises. Eventually, we concluded that the sea rise problem was overall more interesting and allowed for more flexibility in our solution.

On Saturday, we met at 8:00 AM and determined an ideal plan for the day - which was changed hourly. We spent most of the morning acquiring information about sea level risings and beach erosion. By dinnertime, we individually read at least fifteen expert reports on various aspects of global warming, sea level rise, inundation, and beach erosion. After dinner, we knew most of the aspects of the sea level rise and how to model their effects. Only to realize, that we needed additional research to determine the conditions of the areas which we wanted to model. So back to our computers monitors we went, searching on Google and every database possible to find these few pieces of data. We finally called it a night approximately at 2:00 AM, shortly after finding only one of required conditions we needed.

On Sunday, Shawn and I returned to our research at 9:00 AM, while Richie began writing some of the introduction and examining our assumptions. Eventually, Shawn and I found the sea level change from a website that stored tide gauge information from the last few decades and another website that conducted a study which revealed the depth and height of the continental shelf near Miami. Afterwards, we began the massive calculations of erosion rates and costs to save the beach. Shawn and Richie continued to work on the calculations and began writing the paper, while I determine the potential cost and effects of inundation. We concluded that night, finished with all of our calculations completed, but with a large portion of the paper still unwritten.

Monday was a day of writing and stress. We spent the entire day frantically typing, citing, and making the occasional figure. The day was an endless stream of consonants and vowels. It was an unpleasant day for three minds dominated by math and physics. However, by 6:00PM the paper needed only the conclusion and abstract. We collectively edited the paper, tacking on an eloquently written conclusion and abstract with an hour to spare before our 8:00PM deadline. We printed out our twenty-seven-page explanation of why not to buy property on the Florida coastline and submitted it to the math department.

The MCM was an incredible experience. I never realized how much three students could accomplish in a four-day period. In four days, I had not only learned more about global warming and the impact of sea level rise than I had known in my life previously, but I had learned valuable lessons about solving large-scale practical problems. Shawn and Richie were exemplary role models who taught me innumerable skills that will surely assist me through my remaining three years at Union.

HRUMC: April 19th 2008. Sign-up now by contacting Prof. Friedman

Problem of the Newsletter: March 7, 2008

Unfortunately, no one submitted a winning solution to last week's problem. You can view last week's question with a solution on bulletin boards around Bailey Hall.

Here is this week's problem: Show that no perfect square has a decimal expansion ending in 79. (Or, more generally, what are the possible two-digit endings of squares?)

Professor Friedman will accept solutions to this problem until 12:00 noon Thursday, March 13th. Email your solution to him (friedmap@union.edu) or put it in his mailbox in the Math Department office.