Syllabus for Math 209 – Mathematical Problem Solving

In this course you will be exposed to a number of problem solving techniques and will be expected to practice with them a great deal. We meet once a week on Thursdays in Olin 371 from 2:30 to 3:52.

Credits
This is a half credit course

Typical Class
We'll start each class by having designated students present problems from that assignment due that day. Then, I'll cover a bit of the theory needed to solve the problems to be assigned that week. Finally, you'll start working (in groups, if you like) on the problems assigned for that week. I fully expect that, in the first two parts of the day, each of you will contribute something to the discussion (e.g., ask a question of me or the speaker, add some intuition to someone's solution, etc.).

Assignments
There are no exams in this course, but you'll be expected to work a fair bit both inside and outside of class. Each week I will distribute three problems (of varying level of difficulty) based on what I talked about that week and you are expected to spend at least an hour and a half working on each problem. You will turn in the evidence that you spent an hour and a half on it (or less, if you solved the problem). Here's what I write at the top of each assignment to give you an idea of what this evidence might look like:

Try small cases. Plug in smaller numbers. Do examples. Look for patterns. Draw pictures. Use lots of paper. Choose effective notation. Look for symmetry. Divide into cases. Work backwards. Argue by contradiction. Consider extreme cases. Modify the problem. Generalize. Dont be afraid of a little algebra.

Additionally, for each assignment, I will designate three students who will each present a solution of one of the problems they chose. Over the course of the semester you will have at least three of these presentations and I expect you to present one problem of each level of difficulty over time. To help with this, I have office hours on Wednesdays to help you get unstuck if you get stuck. For the first presentation you do, I will require that we meet the Wednesday before your presentation so that you can give a dry-run of it.

Grades
Your grade will be determined a follows:

- 25% attendance
- 15% participation
- 30% written work
- 30% presentations

Presentations
Your presentations will be graded by me, with some input from your classmates. You will

receive feedback sometime after class, probably by e-mail. Here are some tips for presenting:

- Your target audience is your classmates. You should adjust your speed and explanations accordingly.
- At least for your first presentation, you should use the blackboard rather than slides. This forces you to go slowly, giving your audience enough time to absorb what you are writing.
- If the board is blank, don't start writing in the center of the board; instead, start in the top left.
- Don't present with the eraser in one hand, erasing each line of what you write immediately after you've written it!
- Give full verbal commentary, emphasizing the main ideas. You don't need to write everything you say on the board. However, it should be possible for a transcription of everything you write on the board to be mostly understandable to someone who didn't attend class.
- Know the material that you are presenting, reading over it several times beforehand if necessary.
- Be welcoming to questions, and answer any questions in a careful manner.

Grading rubric for presentations Here's how your presentations will be graded:
Mathematical Content:

1 Is the solution correct, complete and without unnecessary parts? [6 points]

Understandability

2 Are the explanations clear and at the appropriate speed and level as determined by the students? [6 points]
3 Are questions handled well? [2 points]

Delivery

4 Is there an appropriate amount of commentary and is it audible? [2 points]
5 Is the board work well-organized and readable? [2 points]
6 Did the speaker pay attention to the audience, including making eye contact? [2 points]

Course Webpage
I will post problem sets and various interesting links on the course website:

`http://www.unix.bucknell.edu/~ncr006/teaching/209/f11`