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Mathematics MAT 300 : Problem Solving Seminar
Fall 2007
TBA

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Course Materials
  Lecture Notes
  Brain (required)

Introduction
  This problem solving seminar has two main goals. The first goal is to make you into a better mathematical problem solver. We will attempt to achieve this by concentrating on the types of problems that occur in mathematical contests throughout the country and world. The nice things about these problems is that the solutions tend to use only elementary techniques, so we will not require any advanced mumbo jumbo like Abstract Algebra, Analysis, or Non-linear Hypergeometric Bundle Theory. While there are infinitely many problems that can appear in a contest, there are several themes that reoccur that we can explore to give ourselves a fighting chance.
  This brings us to our second goal. The Putnam Mathematical Competition. The William Lowell Putnam Competition is an annual student math competition sponsored by the Mathematical Association of America. More than 2000 students from colleges and universities in the United States and Canada participate in this contest each year. The Putnam competition is held simultaneously at participating universities, usually on the first Saturday of December. This year the competition will be held on Saturday, December 1. For more information about the contest, including past exams and solutions, visit http://www.unl.edu/amc/a-activities/a7-problems/putnamindex.shtml.

Exams
  The exam will be held on Saturday, December 1, from 10:00 a.m. to 6:00 p.m. Participation in the exam is required for the course. As an extra incentive, I will treat the participants to a free lunch at the Empire Dynasty Chinese Buffet in New Hartford.

Homework
  I will pass out problems each week which you will attempt to solve for discussion the following week. Since the Putnam Exam is a written graded exam, your solutions must be written in a form suitable for submission. Writing solutions to complex problems takes practice and experience. For this reason, we will spend a considerable amount of time writing and rewriting solutions. A poorly written correct solution can loose points in the contest, whereas a well written partial solution can gain points. In addition to being valuable in the contest, working on good writing now will parlay itself into success in other mathematics courses, and in life! You will keep and maintain a homework problems portfolio, which will be periodically checked for accuracy and completeness.

Attendance and Class Participation
  Since this is a seminar course, attendance and class participation are mandatory.

Grading
Your grade in this course will be based on your homework problems portfolio, improvement over the course, and participation in the Putnam Exam on December 1.

Calculators
  Since calculators are not allowed on the Putnam exam, you should try to refrain from using one as much as possible for solving the homework problems. Although you may use a calculator to satisfy an idle curiosity here and there.

Important Dates

Saturday, December 1 – Putnam Exam

Suggestions

- Do not give up on a problem if you do not see the solution right away. Keep working!

- Try to look at the problems a little bit every day.

- If you get stuck, or need a pointer, feel free to stop by my office or in the hallway for a hint or suggestion.

- The best math students in the world this exam. You should feel proud to be a part of this.

- Do not attach too much of your self esteem to your performance on the exam. The median score is 1 out of 120!

- Have fun!

Topics

- Problem Solving Heuristics

- Pigeonhole Principle

- Mathematical Induction

- Modular Arithmetic

- Inequalities

- Geometry

- Diophantine Equations

- Polynomials

- Recurrence relations

- Combinatorics

- Generating Functions

- Rational and Irrational Numbers