

## PreCalculus Final Project 2005: Mathematical Puzzles, Games and Paradoxes

Choose a topic about a **mathematical** puzzle, game or paradox. A puzzle is a problem that does not have an obvious solution. A paradox is seemingly contradictory. A game is a mathematical game, such as Nim. Everyone must pick a different topic and sign up. First one signed up wins!

### Potential Topics

Zeno's paradox; Cantor's infinities; Tower of Hanoi; Bridges of Konigsberg; Four color map problem; Three men and the missing dollar; Lewis Carroll; Prisoner's Dilemma; and many others...

**CAUTION:** Choose a reasonable topic. For example, do not try to explain the best strategy for chess.

### Sources

**Math Forum, the best starting point for any mathematical searches** [www.mathforum.org](http://www.mathforum.org)

**Tower of Hanoi** <http://www.dcs.napier.ac.uk/a.cumming/hanoi/>

**Famous Paradoxes** <http://mathforum.org/isaac/problems/paradox.html>

**Math and Logic Puzzles** <http://puzzles.karplus.org/>

**Zeno's Paradox and related paradoxes** <http://members.aol.com/kiekeben/zeno.html>

*Mathematical Fallacies and Paradoxes*, Bryan Bunch, 1982.

*Labyrinths of Reason: Paradox, Puzzles and the Frailty of Knowledge*, William Poundstone, 1988.

*The Mathematics of Oz*, Clifford A. Pickover, 2002.

### Sources I have in the classroom:

*The Everything Kid's Math Puzzle Book*, Meg Clemens et al, 2003.

*One Equals Zero and Other Mathematical Surprises*, Movshovitz-Hadar and Webb, 1998.

*Knotted Doughnuts and other Mathematical Amusements*, Martin Gardner, 1986.

*aha! and aha! Gotcha: Paradoxes to puzzle and delight*, Martin Gardner, 1978 and 1982.

*Pentagames and Puzzlegrams*, Pentagram, 1990 and 1989.

*Math for Smarty Pants*, Marilyn Burns, 1982.

Numerous other math puzzle, logic and game books.

### Your task

I. Prepare a one page description for your classmates about your puzzle, game or paradox. This must be handed in one week before we start class presentations. This means you CANNOT change your topic after this is handed in.

1. For a game, you should describe the game's rules and objective well enough that your classmates can play the game after reading your description.
2. For a puzzle or a paradox, you should pose the problem and identify any assumptions or constraints. Your description should be detailed enough that your classmates can understand the puzzle or paradox and try to solve it or understand it.

II. Present an oral presentation to the class (5 – 10 minutes.) Summarize the puzzle, game or paradox. Tell us about any historical background for your topic. Describe the mathematics involved in the puzzle, game or paradox. Describe the best strategy for the game or a solution for the puzzle or insight into the paradox. Explain why this is the best strategy or solution.

Make sure you use a visual aid, for example, a poster, a Power Point presentation, handouts or game pieces for your topic. Power Point presentations or web sites are preferred to posters because everyone can see them. Be sure to use the rubric as a checklist to prepare your presentation.

III. At the beginning of your presentation, hand in a 1 – 2 page summary paper that includes a bibliography. Copy any PP presentations to the PreCalculus folder on the server.

Precalculus Final Project 2005

Name \_\_\_\_\_

Score \_\_\_\_\_

Topic

Summary of Presentation

Criteria	
Topic chosen is about a mathematical puzzle, game, or paradox, (historical background is a plus)	
Quality visual aid(s): shows time, effort and creativity	
Vocabulary use: correct terminology (new vocab is a plus)	
Complexity: you should demonstrate that you learned something new about mathematics (MS math is a minus, HS math is a check, something we've never done in HS is a plus)	
Mathematics: you need to explain/discuss the mathematics that is involved in your topic, explain why your strategy or solution works or the mathematics behind the paradox.	
Expertise: learn enough about your topic to answer questions from an ignorant audience (your classmates and me), especially be able to answer questions from your classmates about other solutions they may have tried	
Class Presentation: organized, clear, interesting voice and manner	
Originality: everyone must choose a different topic or a different aspect of a topic	
Paper: neat, clear summary with details as needed, watch spelling! Accurate list of sources.	
Timeliness: you will lose points if you are not prepared or absent.	