

Mini-Research Projects

Mathematical Explorations – Math 110

Block 2, Fall 2007

Your task is break into groups, (quickly) research a topic in math, and present your findings to the class. I would suggest sending one person to the library, while the rest work in the computer lab searching the internet for short articles. Two excellent on-line sources are Wikipedia (www.wikipedia.com) and MathWorld (mathworld.wolfram.com).

You should finish your research by around 11:00am, then start preparing your presentation. Decide what material to present to the class and how you will divide up the talking. Presentations will start at 11:20am sharp and run until 12:00pm.

1. **Four Color Map Theorem.** Every map can be colored with four colors so that no two adjacent countries have the same color.
2. **Ramsey Numbers.** $R(m, n)$ is smallest number of people necessary so that either m people all know each other or n people all don't know each other.
3. **Poincare Conjecture.** A two-dimensional sphere is the only closed surface with the property that every loop on the surface can be shrunk to a single point while staying on the surface. Is the same true about the three-dimensional hypersphere?
4. **Banach-Tarski Paradox.** A solid ball can be divided into a finite number of pieces, rotated and translated, then put together to form two balls of volume equal to the original ball.