

University of South Carolina
Math 574: Discrete Mathematics I
Section 001
Summer I 2012

Project Ideas

Browse the internet and/or talk to me to find an interesting topic pertinent to our class. I've listed some possible ideas below, but you are not restricted to these. Items marked * are ones I think are particularly interesting or accessible.

Once you have something you think you might like to explore, tell me and we'll decide what's reasonable to cover in twenty minutes.

In addition to the topics below, anything on the Open Problem Garden (<http://garden.irmacs.sfu.ca/>) in a relevant field would be a possibility.

Combinatorics

- Generating Functions
- Partition Numbers*
- Ramsey Numbers*
- Second-Order Linear Homogenous Recurrence Relations

Computer Science

- Coding Theory
- Complexity Classes P and NP*
- Digital Logic Circuits
- Finite-State Automata*
- Halting Problem
- Kruskal's Algorithm*
- Topological Sorting*

Graph Theory

- Cages*
- Cayley's Theorem*
- Erdős' Proof High Girth and Chromatic Number
- Four Color Theorem
- Graham's Number / Knuth Up-Arrow Notation *
- Graph Reconstruction Problem
- Hadwiger-Nelson Problem*
- Hall's Theorem
- Kuratowski's Theorem
- Menger's Theorem

- Perfect Graphs*
- Random Graphs
- Snarks
- Stable Matching

Logic and Set Theory

- Continuum Hypothesis
- Russell's Paradox*
- Zermelo-Fraenkel Set Theory

Number Theory

- Collatz Conjecture*
- Euler ϕ (Phi) Function
- Goldbach Conjecture*
- Properties of Fibonacci Sequence*
- Tao-Green Theorem