

## Math 219 - Study Guide for Test 2

Study class notes, Graded Homework solutions, and all homework problems.

Be able to state all definitions

Be able to state and use the following theorems

- 5 Color Theorem
- Union Theorem
- Edge Theorem
- Euler's Circuit Theorem
- Euler's Path Theorem
- Poset Representation Theorem
- Topological Sorting Algorithm
- Antichain Theorem
- Dilworth's Chain Theorem

### Platonic Solids

Be able to prove there are at most five Platonic solids by showing  $(m - 2)(n - 2) < 4$

### Chromatic Numbers and Polynomials

- Be able to find the chromatic number of a given graph
- Be able to **prove** Case 2 of the 5 Color Theorem
- Be able to use counting arguments to find chromatic polynomials
- Be able to use the Union Theorem and Edge Theorem to find chromatic polynomials
- Know the polynomials for  $K_n$ ,  $I_n$ , and trees (including  $P_n$ )
- For others, like  $C_n$ , you would be given the polynomial and be expected to verify it

### Eulerian Multigraphs

- Be able to **prove** Case 2.1 of Euler's Circuit Theorem ( $\Leftarrow$ )
- Be able to find Eulerian circuits and paths
- Be able to use Euler's Circuit and Path Theorems

### Partially Ordered Sets

- Be able to state and use the definition of a partially ordered set to do simple examples
- Be able to draw Hasse diagrams
- Find maximal and minimal elements of a poset
- Determine length and width of a poset
- Partition a poset into chains and antichains (using the proofs of the partition theorems)