Fall 2015, Math 431: Review Problems
Due: Thursday, October 29th, 2015
Exam 2 Review

Exam review problems. As the name suggests, these problems are intended to help you prepare for the upcoming exam.

(ER1) Find the number of paths (no repeated vertices) in the complete bipartite graph $K_{n,m}$.

(ER2) Find all automorphisms of K_n with one edge removed.

(ER3) Which complete graphs K_n have Eulerian cycles? Which complete bipartite graphs $K_{n,m}$ have Eulerian cycles?

(ER4) How many Hamiltonian cycles does the wheel graph W_n have?

(ER5) Prove that all longest paths in a tree (not just any two) have a vertex in common. Is it always just a single vertex?

(ER6) Find the number of spanning trees of the complete bipartite graph $K_{n,2}$, $n \geq 2$. Use the Matrix-Tree Theorem to verify your answer.

(ER7) Find the chromatic polynomial of the cycle graph C_n.

(ER8) Prove that the constant term of the chromatic polynomial of any simple graph G is 0.

(ER9) Let $G = (X, Y)$ denote the bipartite graph from problem (R4) on Problem Set 7. Use Hall's Marriage Theorem to prove that there exists a perfect matching from X into Y.

(ER10) Fix $n \geq 5$. What is the maximum number of edges we can remove from K_n *without* producing a planar graph? What if we require the resulting graph to be connected?

Challenge: What is the minimum number of edges we can remove from K_n to produce a planar graph?