

Math 4410
Fall 2009
Exam 1

Name:

Directions:

Complete all seven questions.

Show your work. A correct answer without any scratch work or justification may not receive much credit.

You may not use any notes, calculators, or other electronic devices.

You have 75 minutes.

Problem 1: _____ / 10

Problem 2: _____ / 10

Problem 3: _____ / 10

Problem 4: _____ / 10

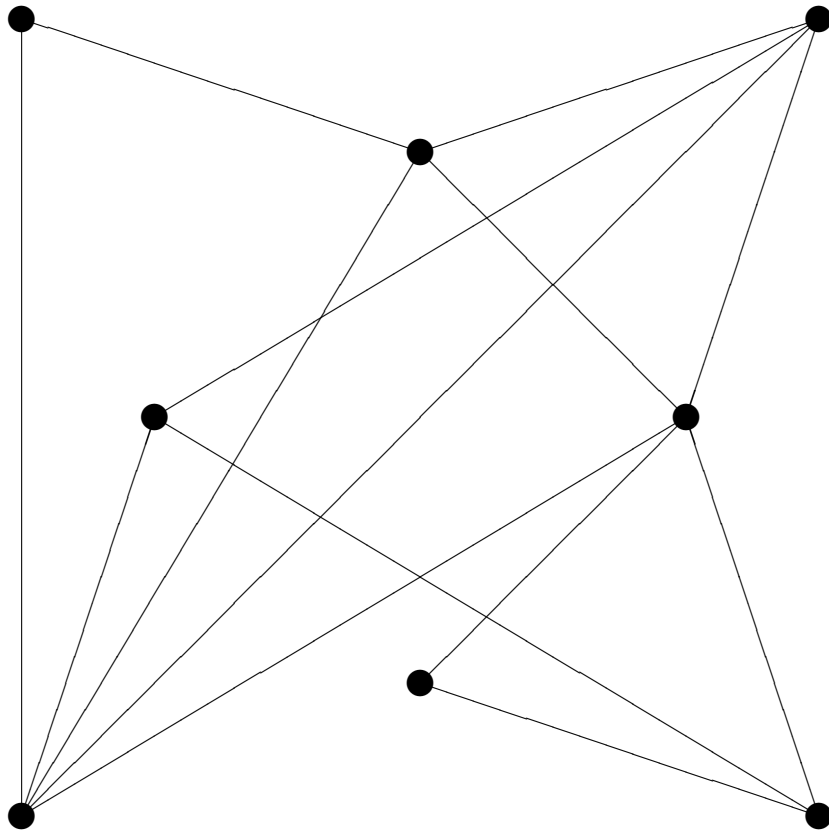
Problem 5: _____ / 10

Problem 6: _____ / 10

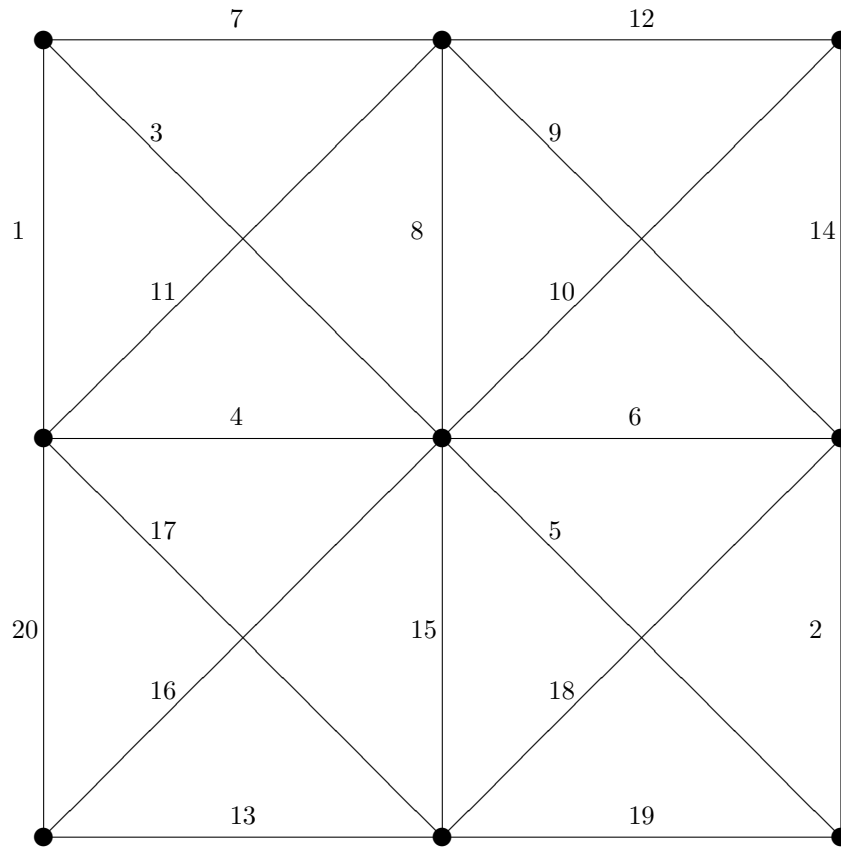
Problem 7: _____ / 10

Total: _____ / 70

1. The following graph is not Eulerian. Make it into an Eulerian graph by adding as few edges as possible.



2. Find a minimal cost spanning tree for the following weighted graph.



3. A simple graph G has ten vertices and 39 edges and no clique on r vertices for some natural number r . Determine the smallest possible value of r .

4. Give the smallest upper bound on the Ramsey number $N(4, 3, 3)$ that you can. You may assume that $N(3, 3, 3) = 17$ and $N(4, 3) = 9$. You are not required to compute $N(4, 3, 3)$ exactly, but only to give as good of an upper bound as you can.

5. How many labeled trees are there on six vertices such that every vertex of the tree has odd degree?

6. Give all non-isomorphic trees on thirteen vertices such that every vertex of the tree has odd degree.

7. A graph G is regular of degree four and has eight vertices. Determine all possible values for the chromatic number $\chi(G)$ and give a graph with each possible chromatic number.