

# Math 118 Summer Session 2, 2004, Hour Exam 1

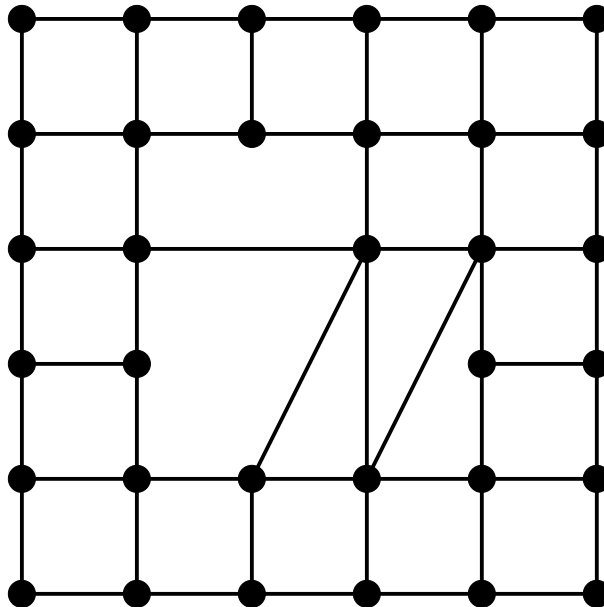
Thomas Cooney

July 2, 2004

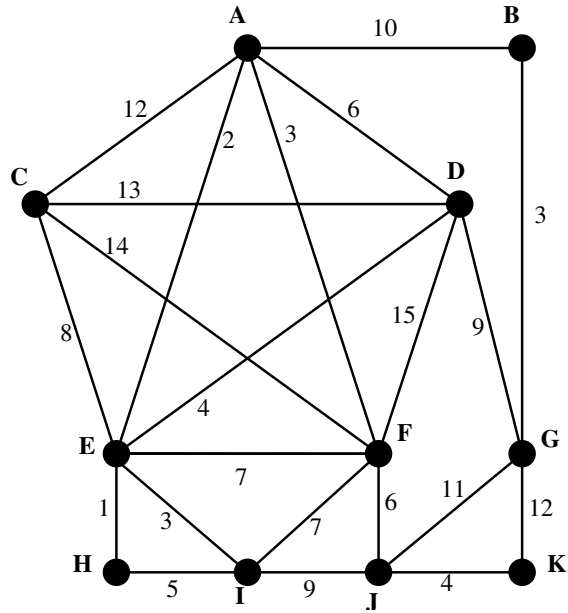
You have fifty minutes to complete this test. Answer **all** questions. Show **all** work. Full marks = 60 points.

**Name:**.....

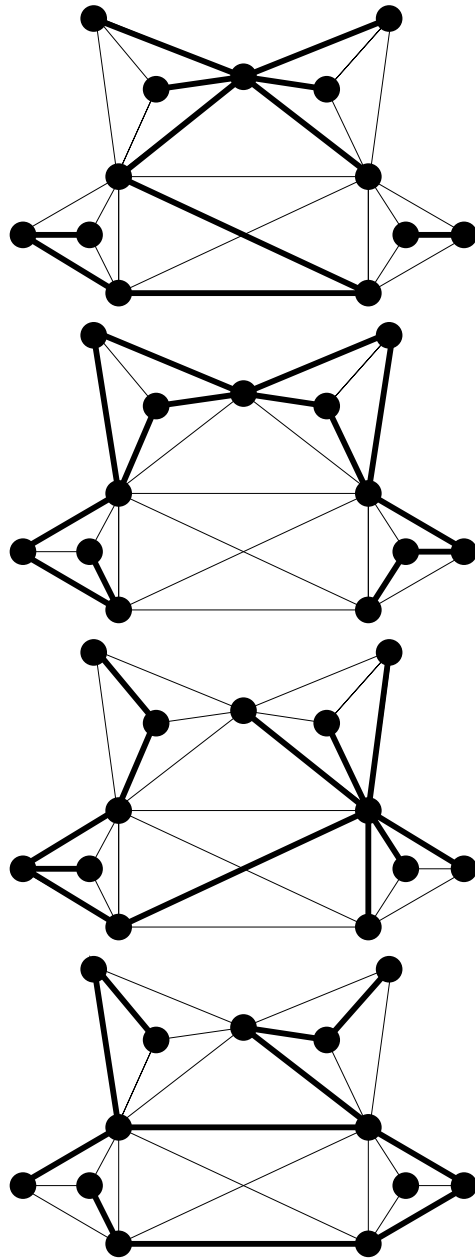
1. Eulerize the following circuit by duplicating edges, duplicating only the minimum number of edges. (8 points)



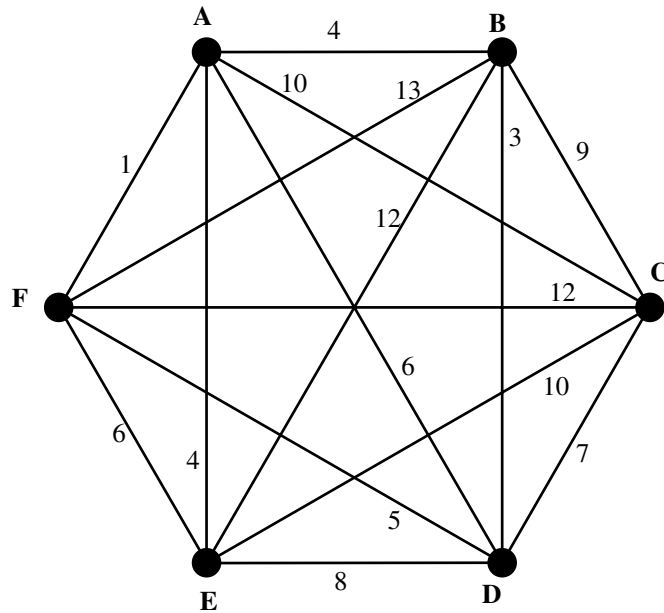
2. Apply Kruskal's algorithm to the following graph. Make a sketch of your answer in the space below, making sure to label all vertices. (8 points)



3. Which of the following are spanning trees for the graph shown? If it is not a spanning tree, explain why. As part of your explanation use labels or arrows to clearly indicate exactly what features cause them not to be spanning trees. (8 points)



4. Apply the sorted edges algorithm to the following graph. Describe your answer by giving the order in which it passes through vertices in the graph. What is the total weight of your answer? (8 points)



5. A bank gives each of its customers a security code, consisting of three letters (upper or lower case, possibly the same) followed by two different three digit numbers. The three digit number 000 is not allowed. How many different security codes are possible?

How many are possible if all 6 numerical digits that appear must be different? (8 points)

6. What is an optimal production policy? (5 points)

7. A paper recycling company uses scrap cloth and scrap paper to make two different grades of recycled paper. A single batch of grade A recycled paper is made from 25 pounds of scrap cloth and 10 pounds of scrap paper, whereas one batch of grade B recycled paper is made from 10 pounds of scrap cloth and 20 pounds of scrap paper. The company has 100 pounds of scrap cloth and 120 pounds of scrap paper on hand. A batch of grade A paper brings a profit of \$500, whereas a batch of grade B paper brings a profit of \$250.

What amounts of each grade of paper should be made?

(Your answer should include a mixture chart summarizing the above information, the relevant inequalities and a sketch of the feasible region.) (15 points)