



MATH 113 – 2001F

EXAM - I

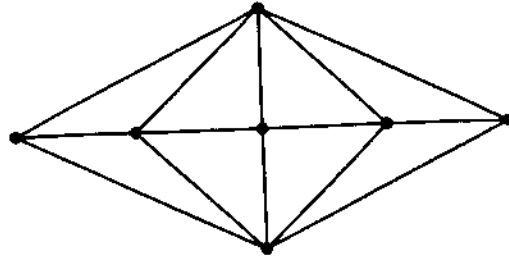
PLEASE BE SURE TO PRINT AND MARK ON THE ANSWER SHEET:

- 1. NAME (last, first)**
- 2. SOCIAL SECURITY NUMBER (student ID number)**
- 3. COURSE AND SECTION NUMBER**

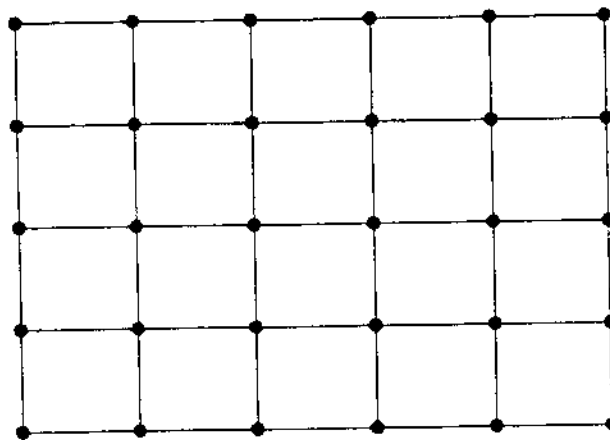
- ✓ To receive proper credit make sure all erasures are complete.
- ✓ Your exam should contain 17 problems.
- ✓ Please write your name and section number on page 5.
- ✓ Submit pages 5 through 8 along with your answer sheet.

The following multiple choice questions are worth 5 points each.

1. In the graph below, we see a territory for a parking – control officer that has no Euler circuit. How many sidewalks (edges) need to be dropped in order to enable us to find an Euler circuit?

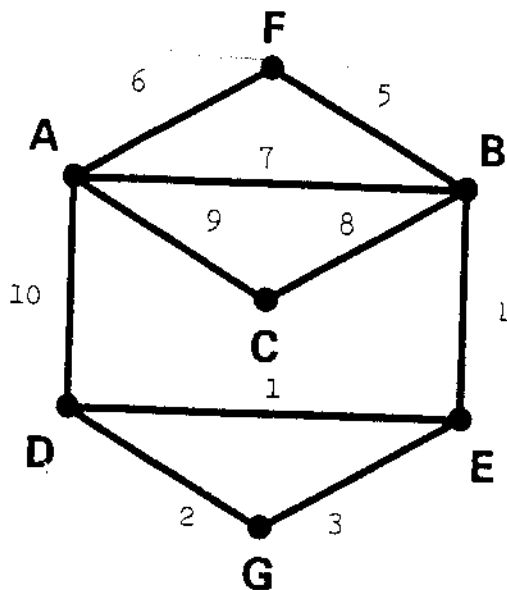


- a. 4
 b. 2
 c. 3
 d. 5
 e. 1
2. Using the “edgewalker” technique, what is the minimum number of edges which must be duplicated in the accompanying graph in order to eulerize the graph?



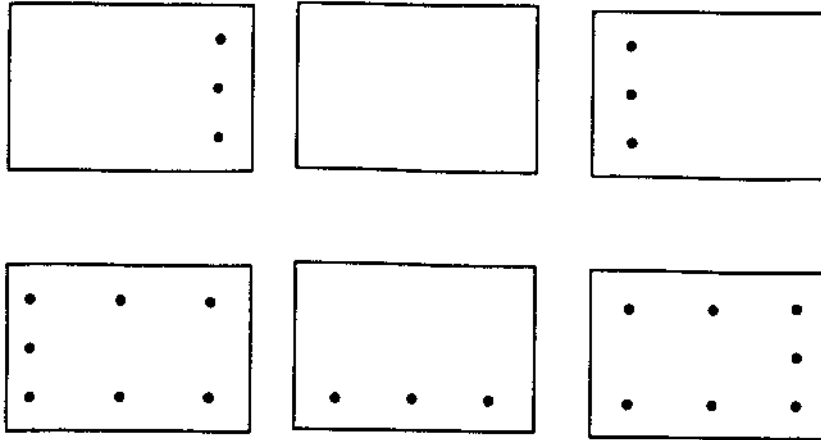
- a. 10
 b. 8
 c. 12
 d. 9
 e. 11

3. Consider the path represented by the sequence of numbered edges on the graph below. Which statement is correct?

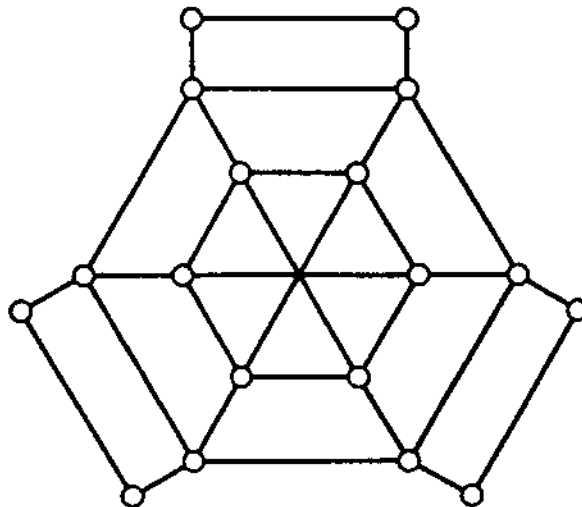


- a. The sequence of numbered edges traverses each edge exactly once, but is not an Euler circuit.
 - b. The sequence of numbered edges forms an Euler circuit.
 - c. The sequence of numbered edges does not traverse each edge exactly once.
 - d. The sequence of numbered edges forms a circuit, but not an Euler circuit.
4. After a major natural disaster, such as a flood, hurricane or tornado, many tasks need to be completed as efficiently as possible. For which situation below would finding an Euler circuit or an efficient eulerization of a graph, be the appropriate mathematical technique to apply?
- a. The Department of Public Works must inspect traffic lights at intersections in the city to determine which are still working.
 - b. Relief food supplies must be delivered to 8 emergency shelters located at different sites in a large city.
 - c. The Department of Public Works must inspect all streets in the city to remove dangerous debris.
 - d. An insurance claims adjuster must visit 10 homes in various neighborhoods to write reports.
5. How many different Hamilton Circuits are there in a complete graph with twelve vertices?
- a. 19,958,400
 - b. 79,833,600
 - c. 9,979,200
 - d. 39,916,800
 - e. None of the above

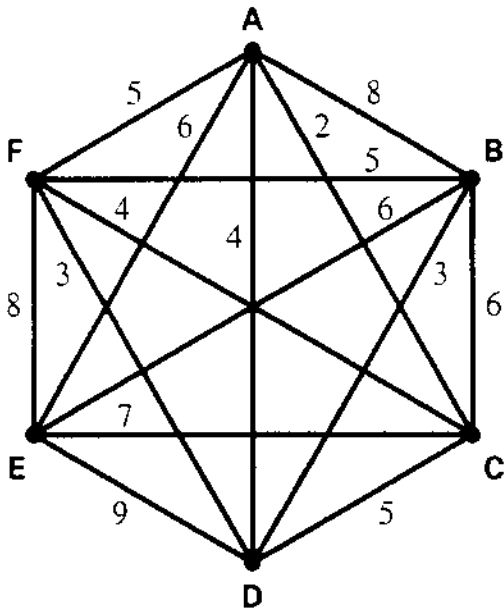
13. (6 pts) For the street network below, draw the graph that would be useful for finding an efficient route for checking parking meters.



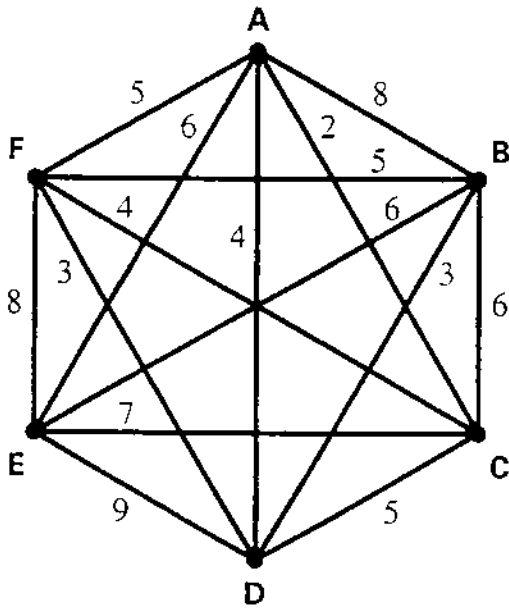
14. (6 pts) Find an Euler circuit on the graph below. Be sure to use numbers on the edges to indicate the direction of the circuit.



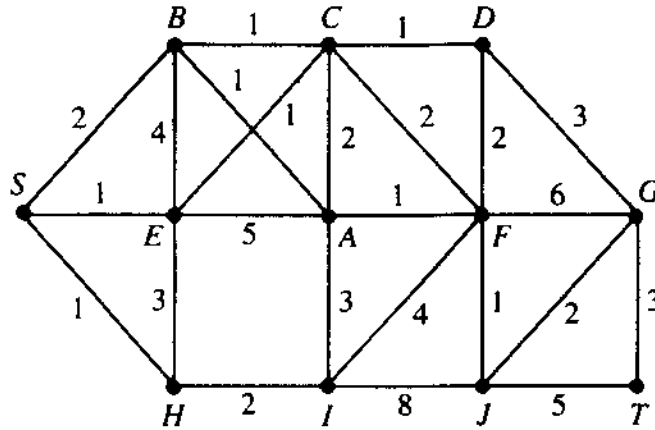
- 15a. Use the nearest-neighbor algorithm starting at vertex C to find a Hamilton Circuit. Write the circuit. (6 pts)



- 15b. Use the sorted-edges algorithm to find a Hamilton circuit. Write the circuit. (6 pts)



16. Use Kruskal's algorithm to find a minimum cost spanning tree for the graph below. (6 pts)



17. Given the order-requirement digraph below (with time given in minutes) and the priority list $T_8, T_5, T_6, T_7, T_2, T_3, T_4, T_9, T_1$. Apply the list-processing algorithm to construct a schedule using three processors. (10 pts)

