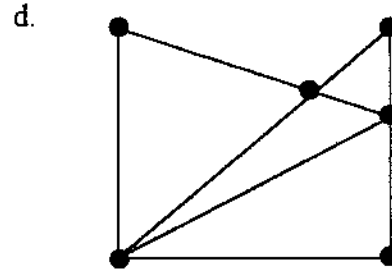
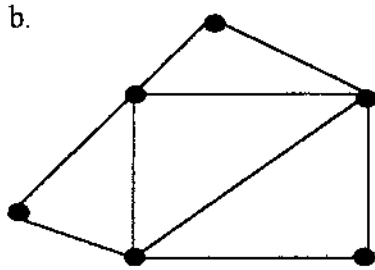
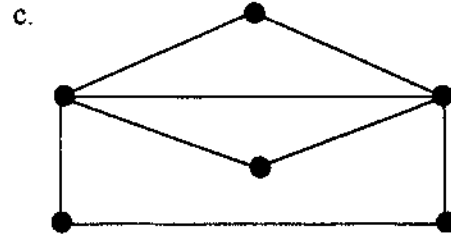
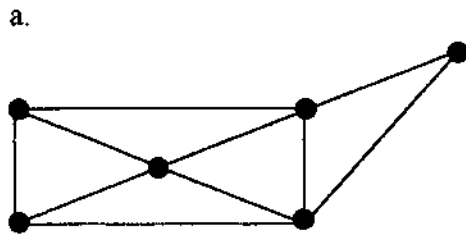
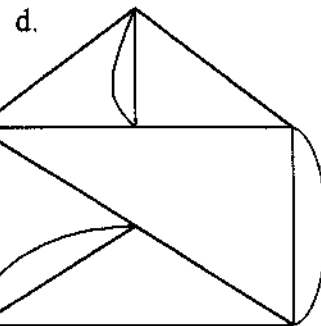
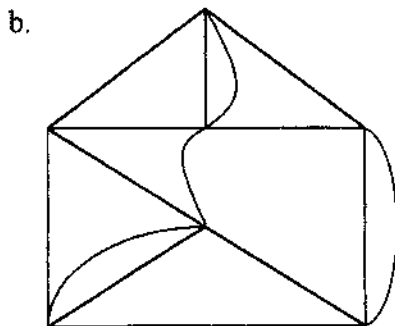
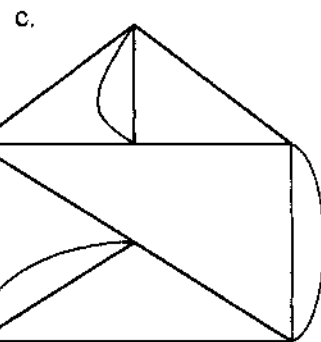
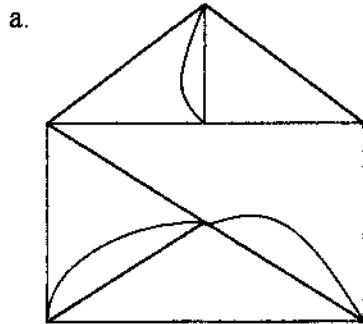
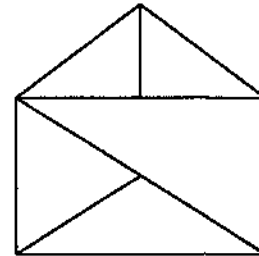


The following multiple choice questions are worth 5 points each.

1. Which of the following graphs does not have an Euler Circuit?



2. Which of the following is a correct Eulerization of the graph on the right?

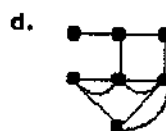
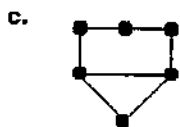
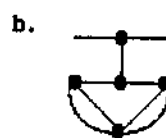
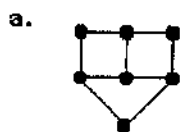
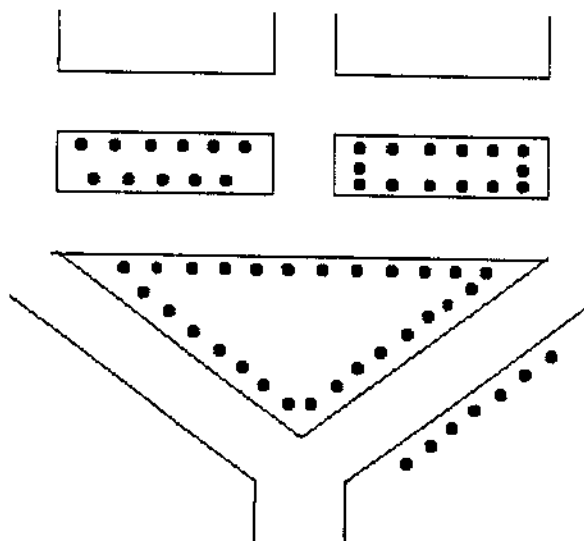


3. Which of the following statements is/are true?

- I. A tree is a connected graph that does not contain a circuit.
- II. An Euler circuit must visit each vertex once and only once.
- III. The minimum completion for an order requirement digraph is the length of the shortest path.

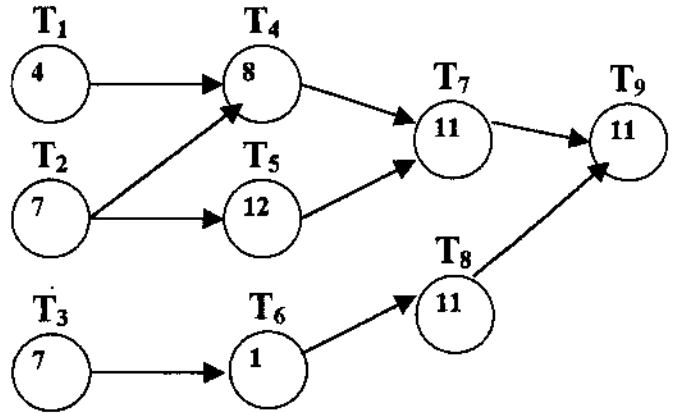
- a. I, II, and III are all true.
- b. I only is true.
- c. I and III only are true.
- d. II only is true.
- e. II and III only are true.

4. The map below shows the territory for a parking control officer. The dots represent parking meters that need to be checked. Which graph would be useful for finding an efficient route?

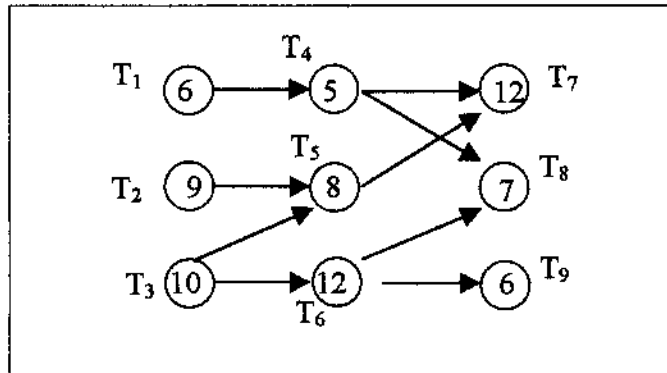


9. What is the minimum completion time for the task represented by the digraph on the right?

- a. 37
- b. 34
- c. 30
- d. 41



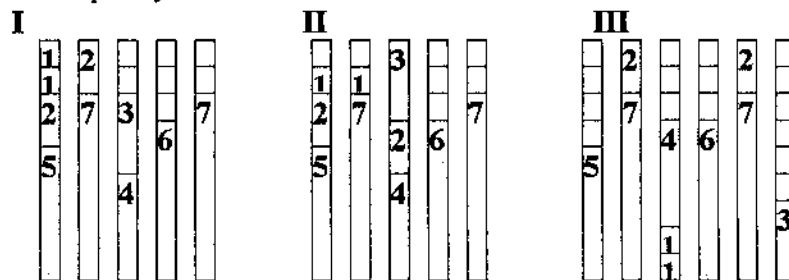
10. Use the critical-path scheduling algorithm to find a priority list for the tasks in this order-requirement digraph.



- a. $T_1T_2T_3T_4T_5T_6T_7T_8T_9$
- b. $T_3T_2T_1T_5T_6T_4T_7T_8T_9$
- c. $T_3T_2T_1T_6T_5T_4T_7T_8T_9$
- d. $T_6T_7T_3T_2T_5T_8T_1T_9T_4$
- e. $T_3T_2T_1T_6T_5T_4T_9T_8T_7$

11. A photocopy shop must schedule independent batches of documents to be copied. The times for the different sets of documents are (in minutes): 12, 23, 32, 13, 24, 45, 23, 23, 14, 21, 34, 53. Construct a schedule using the list-processing algorithm on three machines. Find the completion time.
- a. 123 minutes
 - b. 106 minutes
 - c. 109 minutes
 - d. 144 minutes
 - e. 112 minutes
12. The following are three bin-packings of the items: 5, 7, 2, 1, 1, 4, 6, 7, 2, 3.

The capacity of the bins is 9 units each.



Which of the following statements is true?

- a. Packing I used the First Fit algorithm
Packing II used the Next Fit algorithm
Packing III used the Worst Fit algorithm
- b. Packing I used First Fit algorithm
Packing II used Worst Fit algorithm
Packing III used Next Fit algorithm
- c. Packing I used Worst Fit algorithm
Packing II used First Fit algorithm
Packing III used Next Fit algorithm
- d. Packing I used Worst Fit algorithm
Packing II used Next Fit algorithm
Packing III used First Fit algorithm
- e. Packing I used Next Fit algorithm
Packing II used Worst Fit algorithm
Packing III used First Fit algorithm

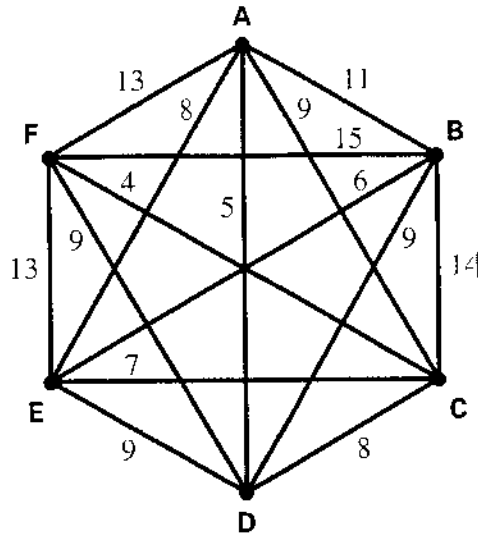
Name: _____

Section: _____

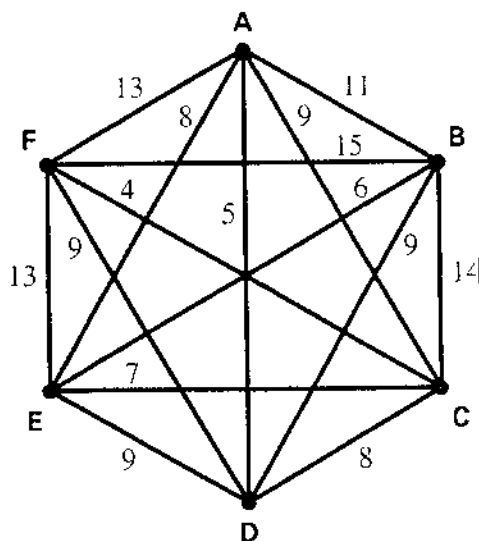
The following questions are free response. Please show all work in order to receive credit.

13. The following questions are true/false and are worth one point each. (1 pt. each)
- A. The valence of vertex A of a graph is the total number of edges of the graph.
- True False
- B. In a connected graph, a path of edges exists between any two vertices of the graph.
- True False
- C. Every graph with an Euler circuit has an even number of vertices.
- True False
- D. The sorted-edges algorithm for solving the traveling salesman problem always gives optimal results.
- True False
- E. The nearest-neighbor algorithm for solving the traveling salesman problem always produces the same result as the sorted-edges algorithm.
- True False
- F. A spanning tree of a graph must contain every edge of the graph.
- True False
- G. A digraph is a graph with exactly two vertices.
- True False
- H. When scheduling tasks using the list-processing algorithm, increasing the number of machines always reduces the completion time.
- True False

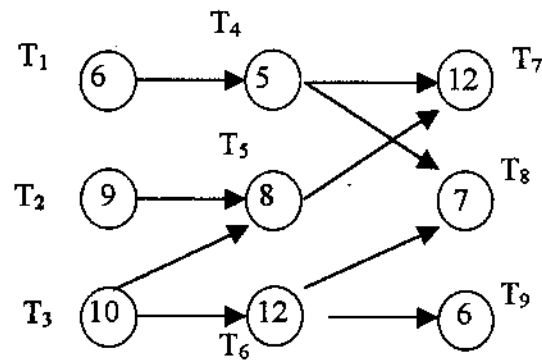
- 14a. Use the nearest-neighbor algorithm starting at vertex A to find a Hamiltonian circuit. Write the circuit. (6 pts.)



- 14b. Use the sorted-edges algorithm to find a Hamiltonian Circuit. Write the circuit. (6 pts)



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



M_1	
M_2	
M_3	

16.

	A	B	C	D	E
A			X	X	X
B				X	X
C	X				X
D	X	X			X
E	X	X	X	X	

A, B, C, D, and E represent the names of five people who work together in a large organization. Their supervisor is planning several projects which will require different people to work together. An "X" means that two people do not work well together. Solve the manager's scheduling problem by drawing an appropriate graph and providing a vertex coloring for it. Each color will represent a different project. (10 pts.)