1. Both vertex A and vertex C have valence 3. Remove one edge from A to B and one edge from B to C. Now both vertex A and vertex C have valence 2 and vertex B has valence 4.

2. Adding three edges to eulerize a graph means we must duplicate three edges of the original graph in order to find an Euler circuit. The real world interpretation of this is we must travel three blocks twice in our circuit.

3. I. False. Every graph with an Euler circuit has all vertices even-valent.

   II. False. It is necessary but not sufficient that a graph be connected in order to have an Euler circuit. In addition, each vertex must have an even valence.

   III. True.

4. $\frac{(n-1)!}{2} = \frac{(9-1)!}{2} = \frac{8!}{2} = 20160$

5. | | |
|---|---|
| From A go to B: | 60 |
| From B go to C: | 10 |
| From C go to E: | 30 |
| From E go to D: | 40 |
| From D go to A: | 80 |
| | 220 |

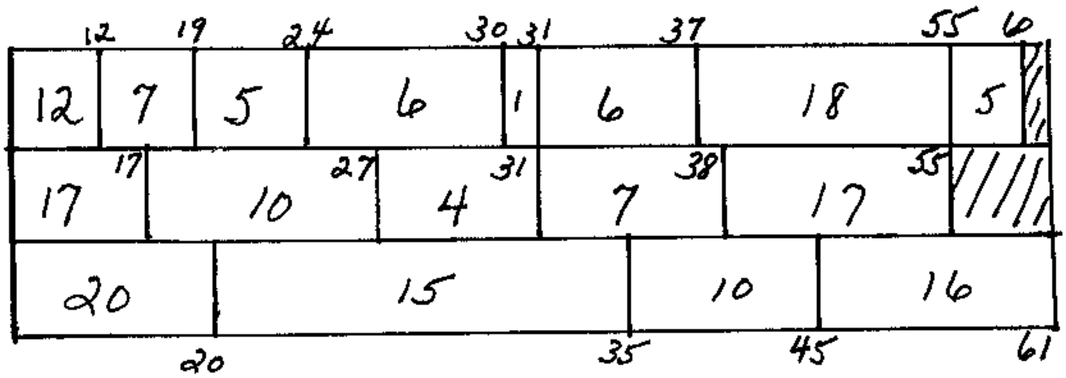
6. Number of license plate codes = 26 x 26 x 26 x 10 x 10 x 10 x 10 = 175,760,000

7. The intercom system does not need to form a circuit; it merely needs to be connected. Therefore, the problem is solved by applying Kruskal's algorithm to find a minimum – cost spanning tree connecting the offices.

8. The longest path, $T_3T_5T_8T_9$, is the critical path.

9. Using the critical path scheduling algorithm, the priority list is $T_3T_5T_2T_6T_1T_4T_8T_7T_9$.

10. The tasks are scheduled on the three processors as follows:

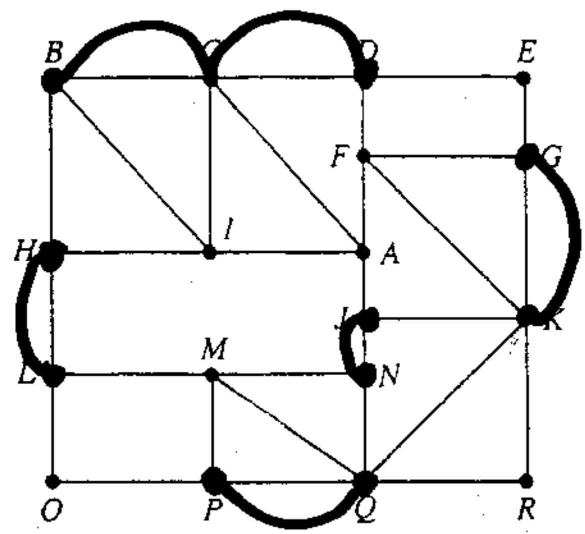


The tasks of lengths 17, 10, 4, 7 and 17 are scheduled on the second processor.

Name:____ Section:__________

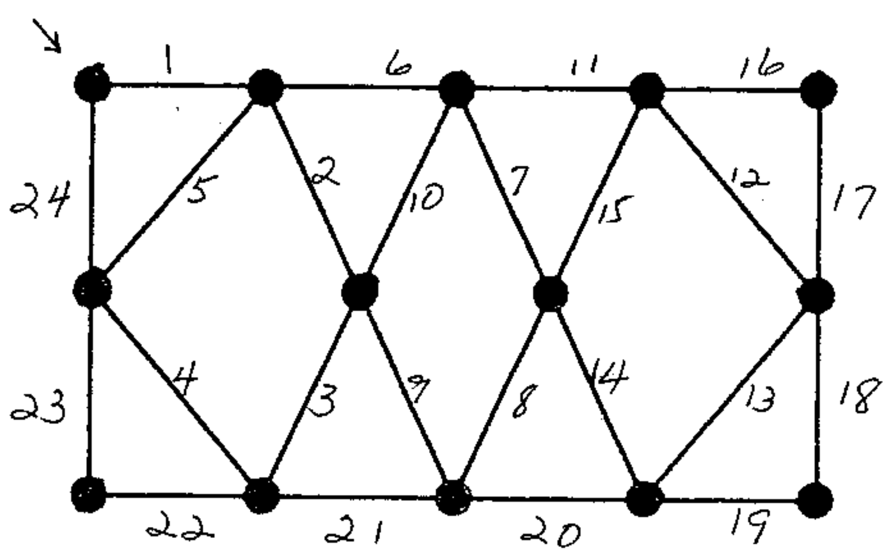
The following questions are free response. Please show all work in order to receive credit.

11. (6 pts.) Eulerize the graph below.



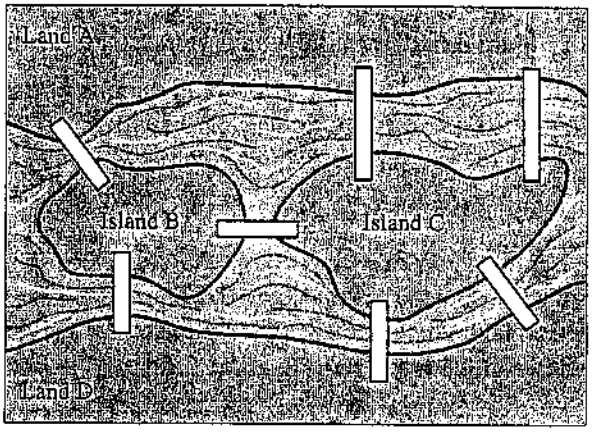
This is one possible eulerization.

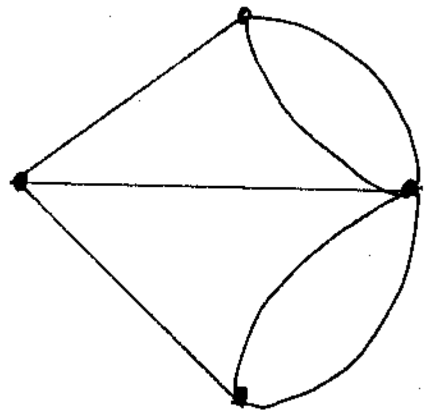
12. (7 pts.) Find an Euler circuit on the graph below.



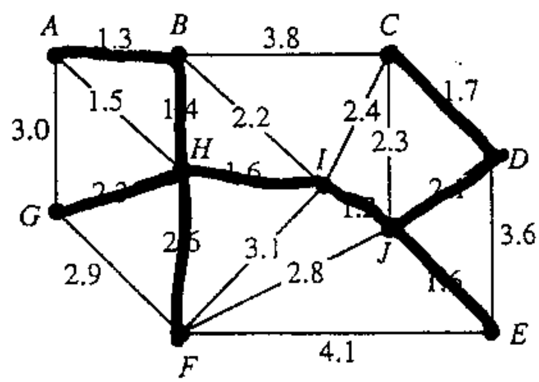
This is one possible Euler Circuit.

13. (6 pts.) The following diagram is of a hypothetical city with a river running through the middle of the city. Draw a graph that would be useful for citizens to use to determine whether it is possible to take a walk, cross each bridge exactly once, and return to their starting point. **Do not find a route.**

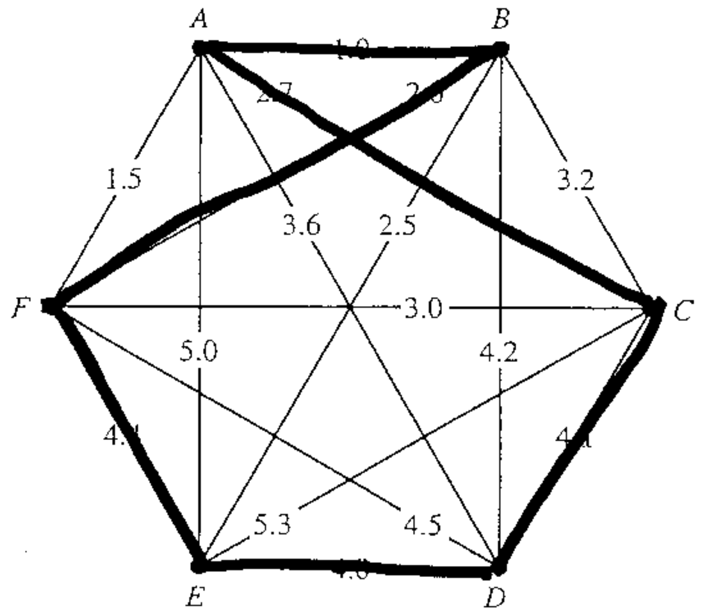




14. (7 pts.) Use Kruskal's algorithm to find a minimum-cost spanning tree for the graph below.



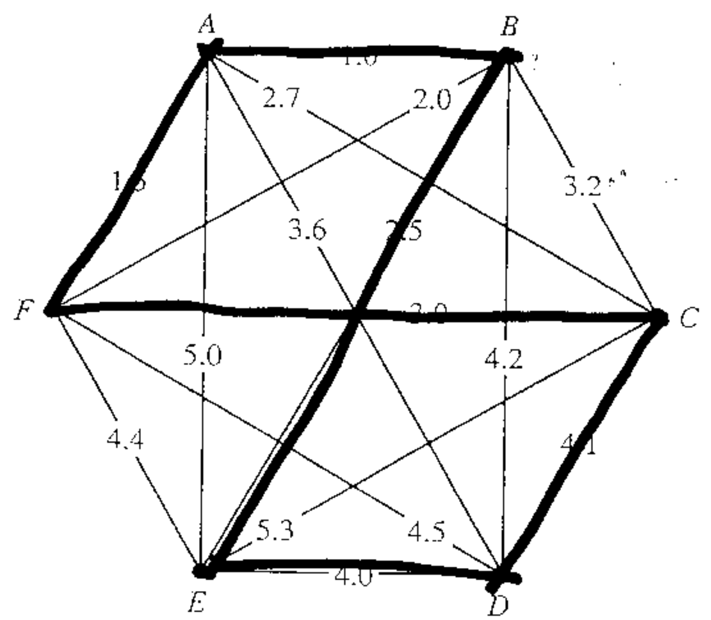
15a. (7 pts.) Use the nearest-neighbor algorithm starting at vertex C to find a Hamilton circuit. Write the circuit.



CA
AB
BF
FE
ED
DC

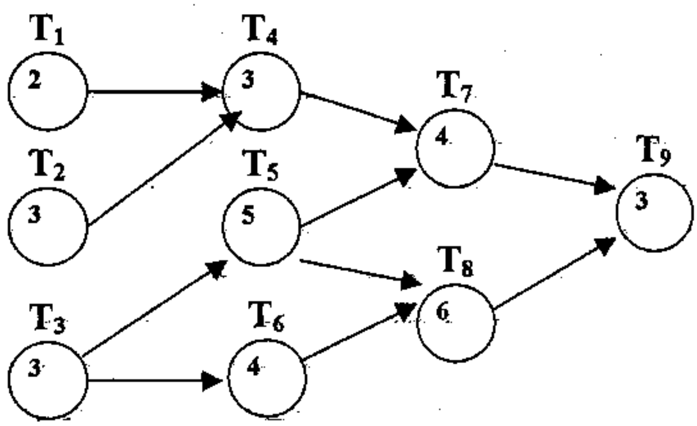
CABFEDC

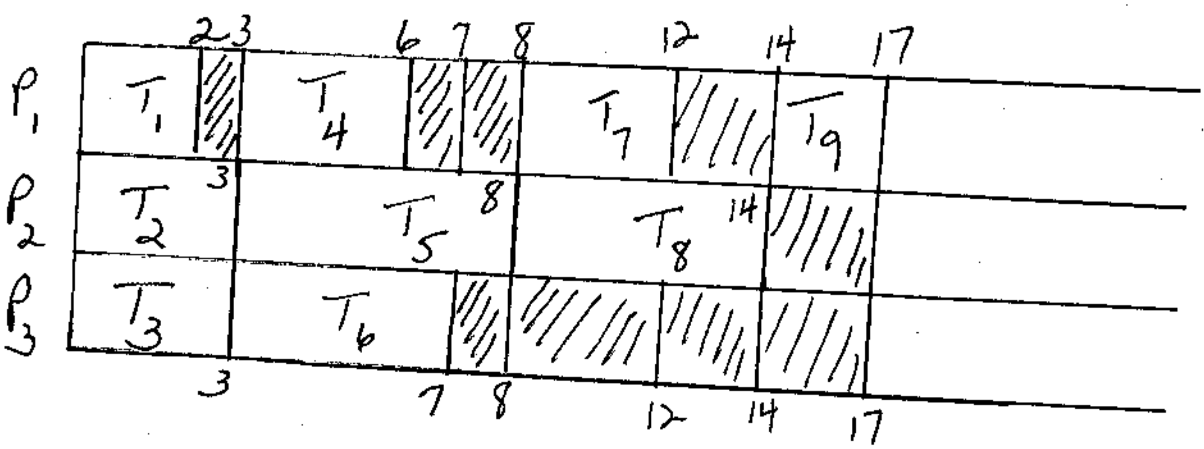
15b. (7 pts.) Use the sorted-edges algorithm to find a Hamiltonian circuit. Write the circuit.



AB
AF
BE
CF
DE
CD

16. (10 pts.) Given the order-requirement digraph below (with time given in minutes) and the priority list $T_1T_2T_3T_4T_5T_6T_7T_8T_9$, apply the list-processing algorithm to construct a schedule using three processors.





Finished: T_1 T_2 T_3 T_4 T_6 T_5 T_7 T_8