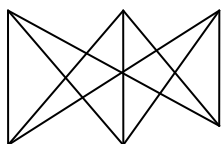


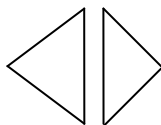
Questions 1- 6 refer to the graph with vertices A, B, C, D, E and edges AD, AC, BD, CC, CE, CD, DE, and DE.

1. Draw the graph.
2. Vertex A is adjacent to which vertices? _____
3. Find the degree of each vertex.
4. Does the graph have an Euler circuit? _____
5. Does the graph have an Euler Path? _____
6. Which edge is a bridge of the graph? (If none, answer "none.")

Questions 7-12 refer to the following five graphs.



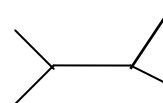
Graph 1



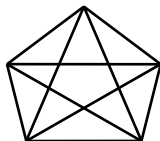
Graph 2



Graph 3



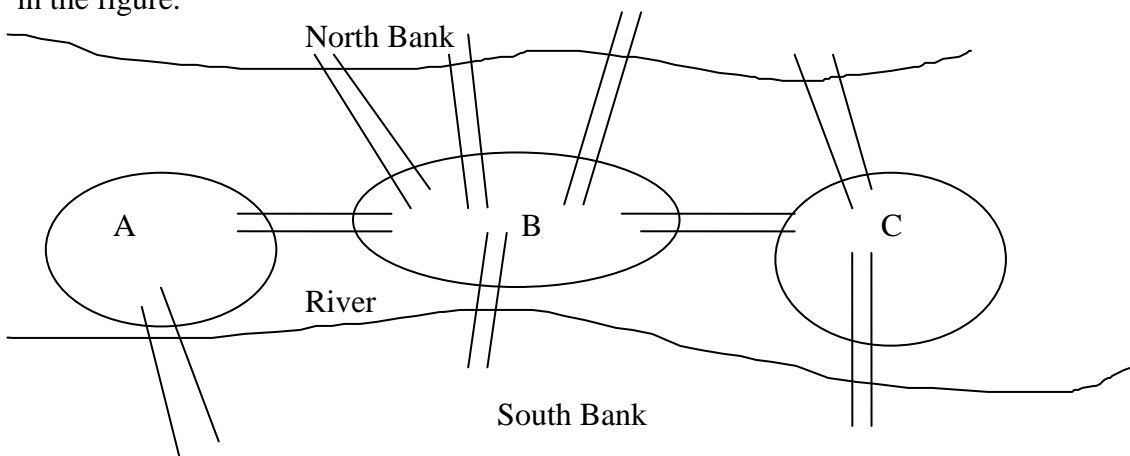
Graph 4



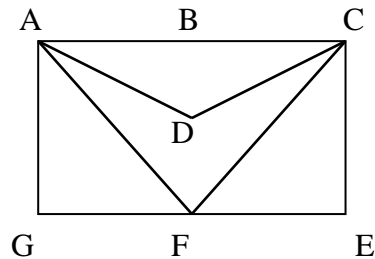
Graph 5

7. Which graph(s) has (have) an Euler circuit? _____
8. Which graph(s) has (have) a Hamilton circuit? _____
9. Which graphs are disconnected? _____
10. Which graph has no circuits? _____
11. In which graph is it true that every edge is bridge? _____
12. Are any of the graphs complete? If so which one(s)? _____

Questions 13 and 14 refer to the following situation: In a certain city there is a river running through the middle of the city. There are three islands and nine bridges as shown in the figure.



13. Draw the graph that represents this situation.
14. Does this graph have an Euler circuit? If so, state the circuit.
15. What is required of a graph that has an Euler circuit?
16. What is required of a graph that has an Euler path?
17. Find an Euler circuit starting at A. Number the edges in the order in which you use them.

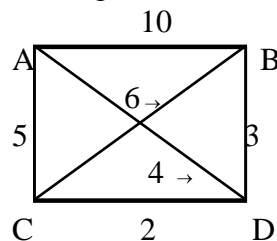


18. Draw a Graph with 5 vertices that has an Euler Path.
19. Draw a graph with 5 vertices that does not have an Euler circuit or an Euler path.

Questions 20-22 refer to the following situation: A delivery truck must deliver packages to 5 different store locations (A, B, C, D, and E) The trip must start and end at A. The distances between the locations are as follows:

	A	B	C	D	E
A	–	10	8	20	30
B	10	–	5	7	15
C	8	5	–	3	12
D	20	7	3	–	25
E	30	15	12	25	–

20. Draw a graph to represent this situation.
21. How many different Hamilton circuits would have to be checked if the Brute Force algorithm was used to find the optimal solution?
22. Use the nearest neighbor algorithm starting at A to find the best route for the delivery truck. What is the total mileage for the route?
23. Suppose you must run some errands. You live in city A and you must visit cities B, C, and D before you return home. Find the **optimal** solution. (The route with the lowest total mileage.) What is the total mileage?



24. Use the preference table below to find the winner using each of the three methods:

Number of Votes	51	45	16	5	5
First choice	H	F	J	F	H
Second choice	F	J	F	J	J
Third choice	D	H	H	D	D
Fourth choice	J	D	D	H	F

Find the winner using:

- a) plurality method
- b) Borda Count
- c) Plurality with elimination