

QQQ – Decision 1 – Chapter 2 – Graphs and Networks (Version 2)

Total Marks: 22

(22 = Platinum, 20 = Gold, 18 = Silver, 15 = Bronze)

1. Explain what is meant by a planar graph.

(2)

(Total 2 marks)

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2.

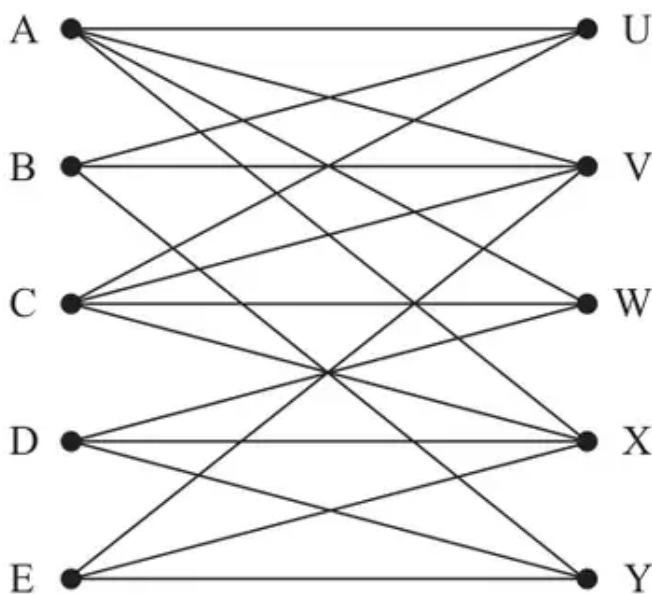


Figure 1

A Hamiltonian cycle for the graph in Figure 1 begins C, V, E, X, A, W, ...

(a) Complete the Hamiltonian cycle.

(1)

(b) Hence use the planarity algorithm to determine whether the graph shown in Figure 1 is planar. You must make your working clear and justify your answer.

(3)

(Total 4 marks)

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3.

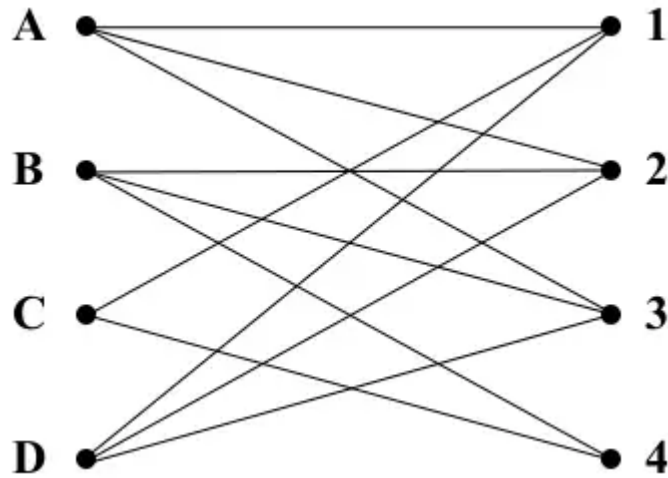


Figure 3

- (a) Write down the name given to the type of graph drawn in Figure 3. (1)

A Hamiltonian cycle for the graph in Figure 3 begins A, 3, B, ...

- (b) Complete this Hamiltonian cycle. (2)

- (c) Starting with the Hamiltonian cycle found in (b), use the planarity algorithm to determine if the graph is planar. (3)

(Total 6 marks)

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4. A simply connected graph is a connected graph in which any two vertices are directly connected by at most one arc and no vertex is directly connected to itself.

- (a) Given that a simply connected graph has exactly four vertices,
- (i) write down the minimum number of arcs it can have,
 - (ii) write down the maximum number of arcs it can have. (2)
- (b) (i) Draw a simply connected graph that has exactly four vertices and exactly five arcs.
(ii) State, with justification, whether your graph is Eulerian, semi-Eulerian or neither. (3)
- (c) By considering the orders of the vertices, explain why there is only one simply connected graph with exactly four vertices and exactly five arcs. (5)

(Total 10 marks)

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