DSII: Quiz 4

Name:	**ID:**

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1. Consider the graph with

$$V = \{A, B, C, D, E, F\}$$

$$E = \{\{A, B\}, \{A, C\}, \{A, F\}, \{B, C\}, \{B, D\}, \{C, E\}, \{D, E\}, \{D, F\}, \{E, F\}\}$$

Find the degree of each vertex.

Solution:

2. Using the same graph as in Question 1, find $N(A)$ and $N(C)$, where $N(v)$ denotes the neighborhood of vertex v, meaning the set of all vertices directly connected to v by an edge. Then verify the Handshake Theorem for the graph.

Solution:

3. Draw the graph with edges

$$A\text{-}B,\ A\text{-}C,\ B\text{-}D,\ C\text{-}D,\ B\text{-}C.$$

Is this graph simple? Briefly justify your answer.

Solution:

4. A graph has degree sequence

$$3, 3, 2, 2, 1, 1.$$

Use the Handshake Theorem to determine how many edges the graph has.

Solution:

5. A graph has a loop at vertex 2 and also has two parallel edges connecting vertices 1 and 2. Is this graph simple? Explain why or why not.

Solution:

6. A graph has degree sequence

$$(4, 3, 3, x, 2, 1, 1)$$

and has 8 edges. Find x.

Solution:

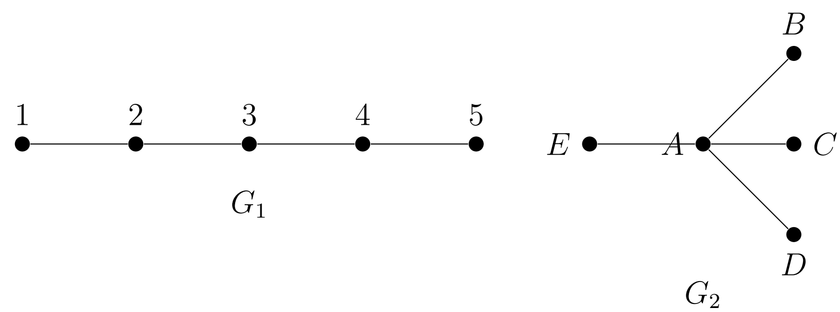
7. Determine whether each graph is possible. If it is possible, state how many edges it has.

(a) A graph with 5 vertices, each of degree 3

(b) A graph with 6 vertices, each of degree 3

Solution:

8. The two graphs G_1 and G_2 below each have 5 vertices and 4 edges. Find the degree sequence of each graph and determine whether they are isomorphic. If they are not isomorphic, state why they are not.



Solution:

9. Let

$$G : V = \{1, 2, 3, 4, 5\}, \quad E = \{\{1, 2\}, \{2, 3\}, \{3, 4\}, \{4, 5\}, \{1, 5\}, \{1, 3\}\}$$

and

$$H : V = \{A, B, C, D, E\}, \quad E = \{\{A, B\}, \{B, C\}, \{C, D\}, \{D, E\}, \{A, E\}, \{B, D\}\}.$$

Determine whether G and H are isomorphic. If they are, give an isomorphism.

Solution: