Exercise 16

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Problem 1.

Solution. (a) It has undirected edges. It has no multiple edges. It has no loops. It is an undirected graph, as well as a simple graph.

(b) It has undirected edges. It has multiple edges. It has loops. It is an undirected graph.

(c) It has directed edges. It has no multiple edges. It has loops. It is a directed graph.

(d) It has directed edges. It has multiple edges. It has loops. It is a directed graph.

□

Problem 2.

Solution.

(a) 6 vertices. 6 edges. The degrees of a, b, c, d, e, f are, respectively, $2, 4, 1, 0, 2, 3$.

(b) 5 vertices. 13 edges. The degrees of a, b, c, d, e are, respectively, $6, 6, 6, 5, 3$.

□

Problem 3.

Solution. 4 vertices. 8 edges. The in-degrees of a, b, c, d are, respectively, $2, 3, 2, 1$. The out-degrees of a, b, c, d are, respectively, $2, 4, 1, 1$. □

Problem 4.

Solution. (a) It forms a simple path of length 4.

(b) It forms a path as well as a circuit, both of length 4.

(c) It does not form a path.

□