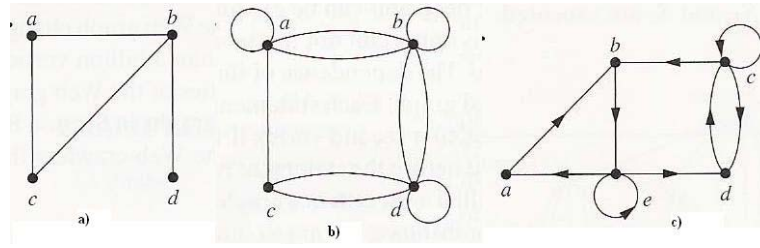


**Foundations of Discrete Mathematics**  
**COT 2104**

**Practice 10**

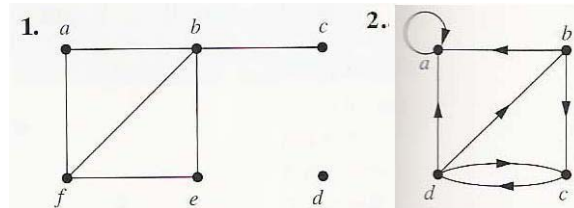
- 1) Draw graph models stating the type of graph used, to represent airline routines where every day there are four flights from Boston to Newark, two flights from Newark to Boston, three flights from Newark to Miami, two flights from Miami to Newark, one flight from Newark to Detroit, two flights from Detroit to Washington, two flights Washington to Newark, and one flight from Washington to Miami, with
  - 2) an edge between vertices representing cities that have a flight between them (in either direction).
  - 3) an edge between vertices representing cities for each flight that operates between them (in either direction), plus a loop for special sightseeing trip that takes off and lands in Miami.
- 4) Determine whether the graph shown is a simple graph, a multigraph (and not a simple graph), a pseudograph (and not a multigraph), a directed graph, or a directed multigraph (and not a directed graph).



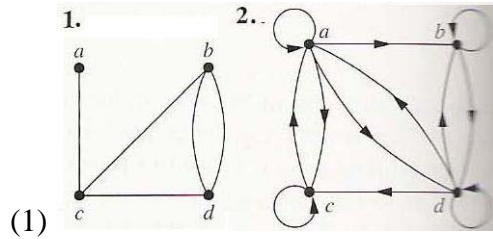
- 5) The intersection graph of a collection of sets  $A_1, A_2, \dots, A_n$  is the graph that has a vertex for each of these sets and has an edge connecting the vertices representing two sets if these sets have a nonempty intersection. Construct the intersection graph of these collections of sets.

- a)  $A_1 = \{0, 2, 4, 6, 8\}$ ,  $A_2 = \{0, 1, 2, 3, 4\}$ ,  $A_3 = \{1, 3, 5, 7, 9\}$ ,  
 (a)  $A_4 = \{5, 6, 7, 8, 9\}$ ,  $A_5 = \{0, 1, 8, 9\}$
- (2) b)  
 (a)  $A_1 = \{\dots, -4, -3, -2, -1, 0\}$ ,  $A_2 = \{\dots, -2, -1, 0, 2, \dots\}$ ,  
 (b)  $A_3 = \{\dots, -6, -4, -2, 0, 2, 4, 6, \dots\}$ ,  
 (c)  $A_4 = \{\dots, -5, -3, -1, 1, 3, 5, \dots\}$ ,  $A_5 = \{\dots, -6, -3, 0, 3, 6, \dots\}$

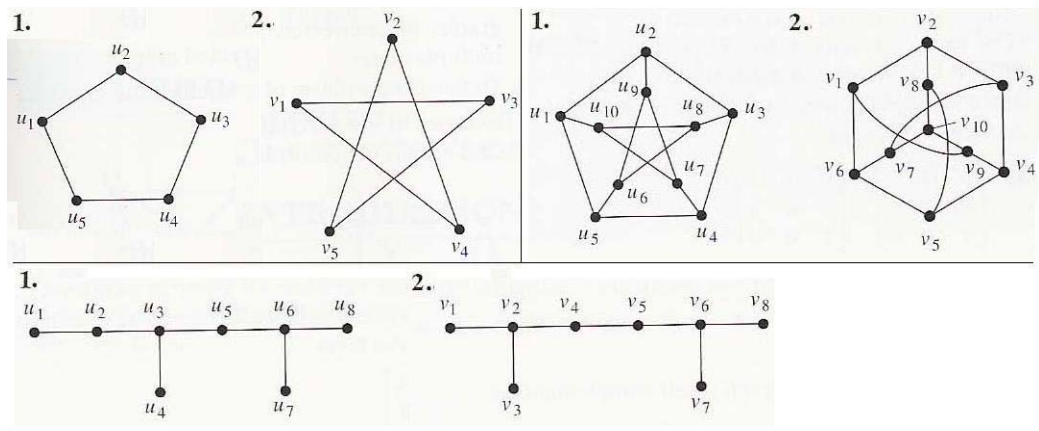
- 6) Find the number of vertices, the number of edges, and the degree of each vertex in the given undirected graph. Identify all isolated vertices. If the graph is directed multigraph find the in-degree and out-degree of each vertex.



7) Represent the adjacency matrix of the following graphs



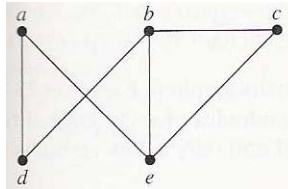
8) Determine whether the given pair of graph is isomorphic.



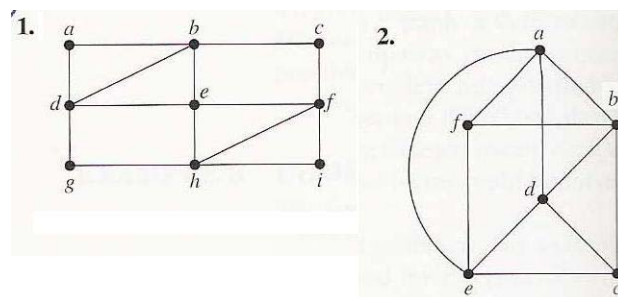
9) Does each of these lists of vertices form a path in the following graph? Which paths are simple? Which are circuits? What are the lengths of those that are paths?

10) a, e, a, d, b, c, a

11) c, b, d, a, e, c.



12) Determine whether the given graph has an Euler circuit. Construct such a circuit when one exists. If no Euler circuit exists, determine whether the graph has an Euler path and construct such a path if one exists.



13) Find the length of a shortest path between a and z in the given weighted graph.

