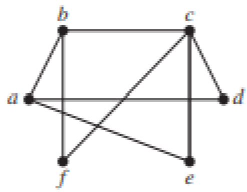
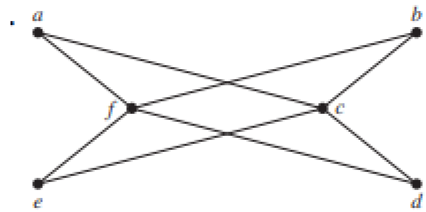
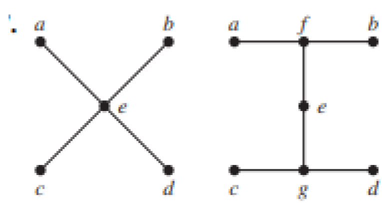
1. Draw these graphs
    a. K_7 b. $K_{1,3}$ c. $K_{4,3}$ d. C_7 e. W_7 f. Q_4
2. Determine whether the graph is bipartite
    a.



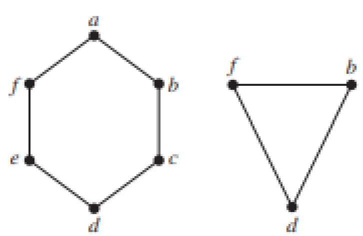
    b.



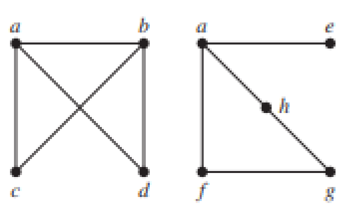
3. Determine whether there is a simple graph for the given degree sequence, if yes draw such graph
    a. 4, 5, 3, 2, 1
    b. 6, 5, 4, 3, 2, 1
    c. 3,3,2,2,2
    d. 3,3,3,2,2,2
    e. 1,1,1,1,1,1
4. Let $G = (V, G)\ where\ |V| = p\ \ and\ |E| = q$, be a graph such that all the vertices have degree k or k+1. If G has t vertices of degree k, then show that $t = p(k + 1) - 2q$.
5. Find union, intersection and symmetric difference of each of the following Graphs
    a.



    b.

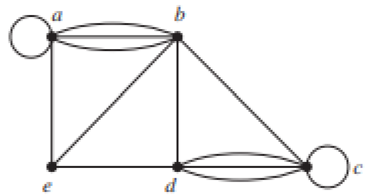


    c.

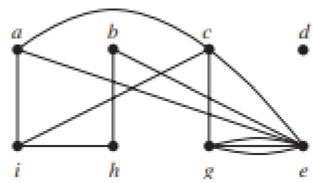


6. Find the degree of each vertex in the undirected graph

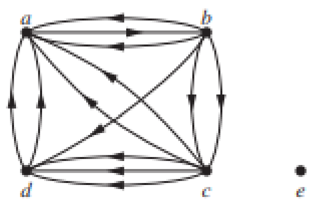
a.



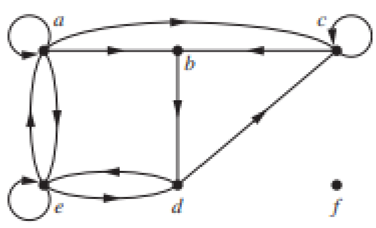
b.



7. Find the in-degree and out-degree and degree of each vertex in the directed graph

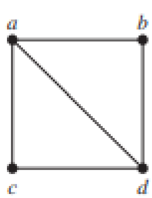


8. Find the underlying graph for the graph with directed edges

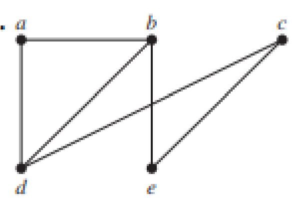


9. Represent the graph using adjacency matrix

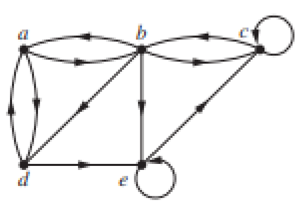
1.



2.



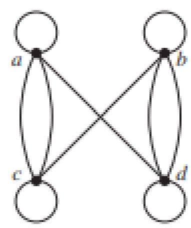
10. Represent the graph using adjacency matrix



11. Represent the graph using adjacency matrix
    a. K_4 b. $K_{2,3}$ c. C_4 d. W_4 e. Q_3
12. Draw the graph with the given adjacency matrix

a. $\begin{bmatrix} 0 & 0 & 1 & 1 \\ 0 & 0 & 1 & 0 \\ 1 & 1 & 0 & 1 \\ 1 & 1 & 1 & 0 \end{bmatrix}$

13. Represent the graph using adjacency matrix

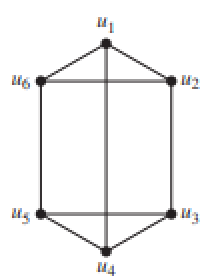


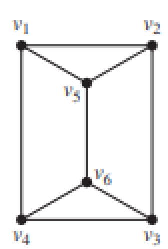
14. Draw the graph with the given adjacency matrix

$$\begin{bmatrix} 0 & 1 & 3 & 0 & 4 \\ 1 & 2 & 1 & 3 & 0 \\ 3 & 1 & 1 & 0 & 1 \\ 0 & 3 & 0 & 0 & 2 \\ 4 & 0 & 1 & 2 & 3 \end{bmatrix}$$

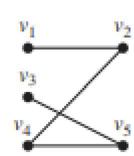
15. Determine whether the given pair of graphs is isomorphic. Exhibit an isomorphism or provide rigorous argument that none exists.

a.

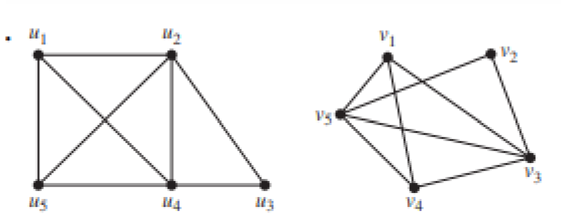




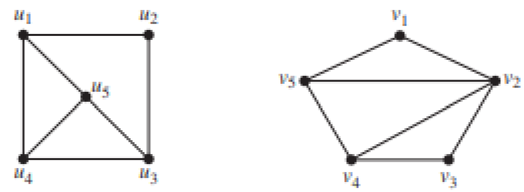
b.



c.



d.



16. Determine the simple graphs with the following adjecency matrices isomorphic?

a) $\begin{bmatrix} 0 & 0 & 1 \\ 0 & 0 & 1 \\ 1 & 1 & 0 \end{bmatrix}, \begin{bmatrix} 0 & 1 & 1 \\ 1 & 0 & 0 \\ 1 & 0 & 0 \end{bmatrix}$

b) $\begin{bmatrix} 0 & 1 & 0 & 1 \\ 1 & 0 & 0 & 1 \\ 0 & 0 & 0 & 1 \\ 1 & 1 & 1 & 0 \end{bmatrix}, \begin{bmatrix} 0 & 1 & 1 & 1 \\ 1 & 0 & 0 & 1 \\ 1 & 0 & 0 & 1 \\ 1 & 1 & 1 & 0 \end{bmatrix}$