***32.** Find an adjacency matrix for each of these graphs.

a) K_n **b)** C_n **c)** W_n **d)** $K_{m,n}$ **e)** Q_n

a) K_n

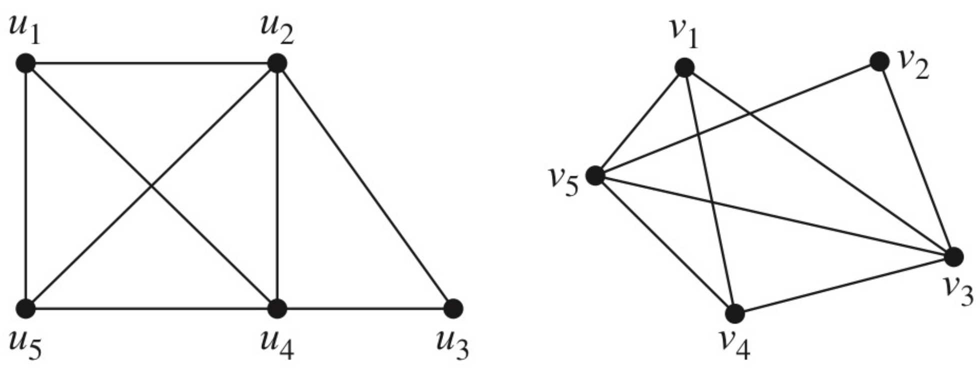
$$\begin{array}{cc} n\text{ rows} & \\ \begin{bmatrix} 0 & 1 & 1 & 1 & 1 & \cdots & 1 \\ 1 & 0 & 1 & \cdots & & & 1 \\ 1 & 1 & 0 & \cdots & & & 1 \\ \cdot & \cdot & \cdot & & \cdot & \cdot & \cdot \\ 1 & 1 & 1 & \cdots & & & 0 \end{bmatrix} & n\text{ columns} \end{array}$$

d)

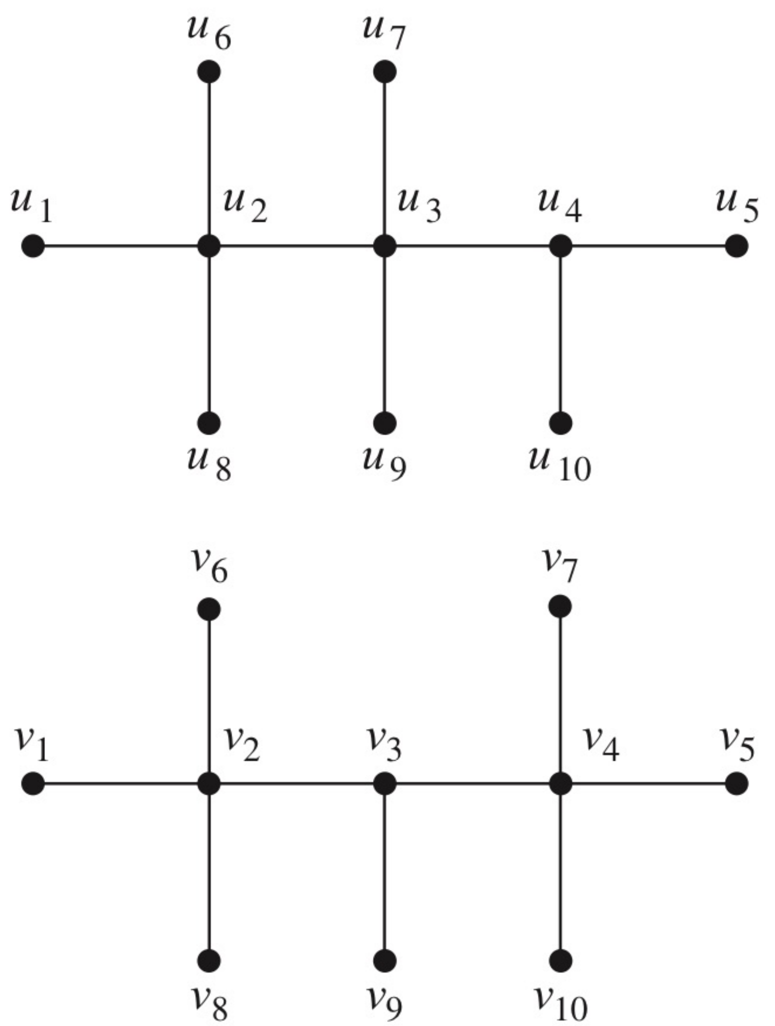
$$\begin{array}{cc} & \begin{array}{cc} m & n \end{array} \quad \text{rows} \\ \begin{array}{c} m \\ \\ n \\ \text{columns} \end{array} & \begin{bmatrix} 0 & 0 & \cdots & 0 & 1 & 1 & \cdots & 1 \\ \vdots & & & & 1 & 1 & \cdots & 1 \\ 0 & 0 & \cdots & 0 & 1 & \cdots & & 1 \\ 1 & 1 & \cdots & 1 & 0 & \cdots & & 0 \\ \vdots & & & \vdots & 0 & \cdots & & 0 \\ 1 & 1 & \cdots & 1 & 0 & \cdots & & 0 \end{bmatrix} \end{array}$$

In Exercises 34–44 determine whether the given pair of graphs is isomorphic. Exhibit an isomorphism or provide a rigorous argument that none exists.

38.



42.



38. yes. $f(u_1) = v_1$ $f(u_2) = v_5$ $f(u_3) = v_2$ $f(u_4) = v_3$ $f(u_5) = v_4$

the adjacency matrices of G and H.

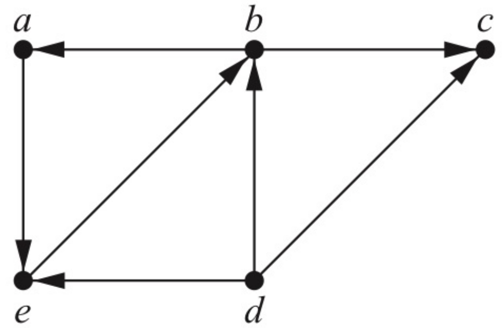
$$A_G = \begin{array}{c} \begin{array}{ccccc} u_1 & u_2 & u_3 & u_4 & u_5 \end{array} \\ \begin{bmatrix} 0 & 1 & 0 & 1 & 1 \\ 1 & 0 & 1 & 1 & 1 \\ 0 & 1 & 0 & 1 & 0 \\ 1 & 1 & 1 & 0 & 1 \\ 1 & 1 & 0 & 1 & 0 \end{bmatrix} \end{array} \qquad A_H = \begin{array}{c} \begin{array}{ccccc} v_1 & v_5 & v_2 & v_3 & v_4 \end{array} \\ \begin{bmatrix} 0 & 1 & 0 & 1 & 1 \\ 1 & 0 & 1 & 1 & 1 \\ 0 & 1 & 0 & 1 & 0 \\ 1 & 1 & 1 & 0 & 1 \\ 1 & 1 & 0 & 1 & 0 \end{bmatrix} \end{array}$$

it follows that f preserves edge so G and H are isomorphic

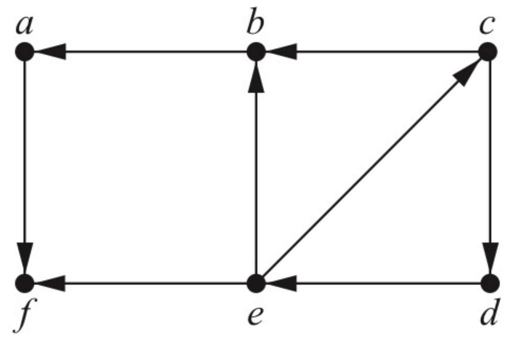
42. no. u_7 is connected with u_3
v_7 is connected with v_3

14. Find the strongly connected components of each of these graphs.

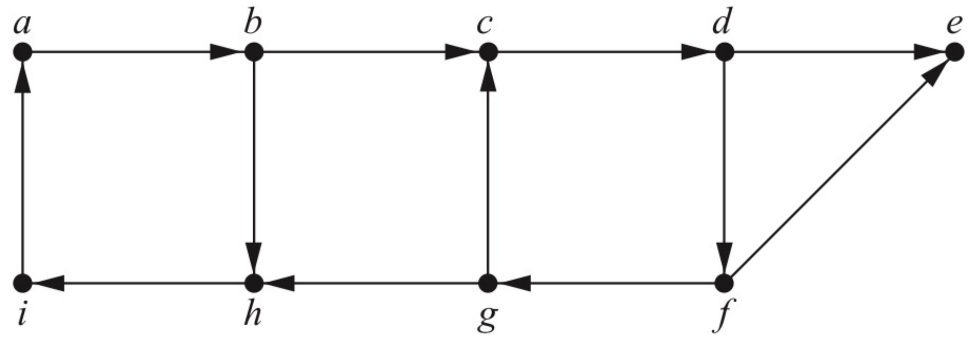
a)



b)



c)



a) node a b e and (a,e)(b,a)(e,b);
node d;
node c

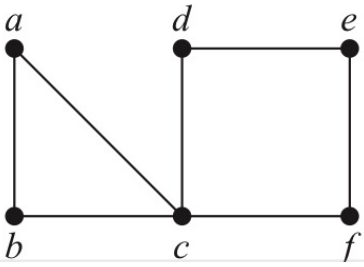
b) node c d e and (c,d) (d,e)(e,c);
node b;
node a;
node f;

c) node a b c d f g h i and
(a,b) (b,c) (c,d) (d,f) (f,g) (g,h) (h,i) (i,a) (b,h) (g,c)
(d,f) ;
node e

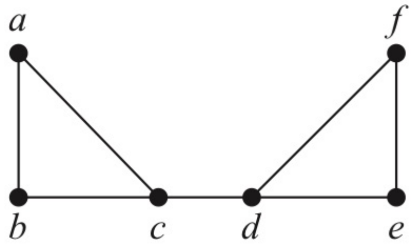
***30.** Show that in every simple graph there is a path from every vertex of odd degree to some other vertex of odd degree.

In Exercises 31–33 find all the cut vertices of the given graph.

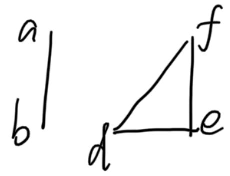
31.

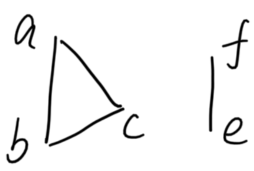


32.



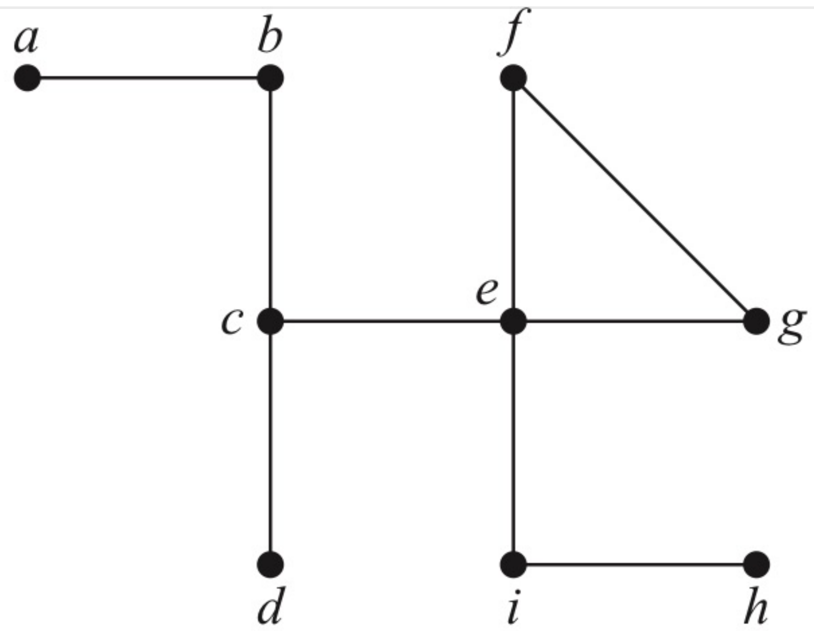
32. c and d.





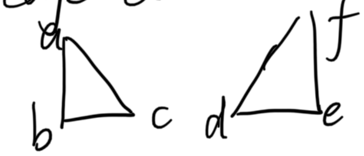
34. Find all the cut edges in the graphs in Exercises 31–33.

33.



31.
no cut edges

32. edge (c d)



33. (a, b);
(b, c);
(c, d);
(c, e);
(e i);
(i h)