P675 9

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

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

c) $\begin{bmatrix} 0 & 0 & 1 & 1 & 1 \\ 0 & 0 & 1 & 1 & 1 \\ 1 & 1 & 0 & 0 & 0 \\ 1 & 1 & 0 & 0 & 0 \\ 1 & 1 & 0 & 0 & 0 \end{bmatrix}$.

d) $\begin{bmatrix} 0 & 1 & 0 & 1 \\ 1 & 0 & 1 & 0 \\ 0 & 1 & 0 & 1 \\ 1 & 0 & 1 & 0 \end{bmatrix}$.

e) $\begin{bmatrix} 0 & 1 & 0 & 1 & 1 \\ 1 & 0 & 1 & 0 & 1 \\ 0 & 1 & 0 & 1 & 1 \\ 1 & 0 & 1 & 0 & 1 \\ 1 & 1 & 1 & 1 & 0 \end{bmatrix}$.

f) $\begin{bmatrix} 0 & 1 & 1 & 0 & 1 & 0 & 0 & 0 \\ 1 & 0 & 0 & 1 & 0 & 1 & 0 & 0 \\ 1 & 0 & 0 & 1 & 0 & 0 & 1 & 0 \\ 0 & 1 & 1 & 0 & 0 & 0 & 0 & 1 \\ 1 & 0 & 0 & 0 & 0 & 1 & 1 & 0 \\ 0 & 1 & 0 & 0 & 1 & 0 & 0 & 1 \\ 0 & 0 & 1 & 0 & 1 & 0 & 0 & 1 \\ 0 & 0 & 0 & 1 & 0 & 1 & 1 & 0 \end{bmatrix}$.

P676 27

13) $\begin{bmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 1 & 1 & 0 \\ 1 & 1 & 0 & 0 & 1 \\ 0 & 0 & 1 & 1 & 1 \end{bmatrix}$.

14) $\begin{bmatrix} 1 & 1 & 1 & 1 & 0 & 0 & 0 & 0 \\ 1 & 1 & 1 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 1 & 1 & 1 \\ 0 & 0 & 0 & 1 & 0 & 1 & 1 & 1 \end{bmatrix}$.

15) $\begin{bmatrix} 1 & 1 & 1 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 1 & 1 & 1 & 0 & 0 \\ 0 & 1 & 1 & 0 & 0 & 1 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 1 & 1 & 0 & 1 \end{bmatrix}$.

P676 37

This pair is isomorphic. The isomorphism can be: $f(u_1)=v_1$, $f(u_2)=v_3$, $f(u_3)=v_5$, $f(u_4)=v_7$, $f(u_5)=v_2$, $f(u_6)=v_4$ and $f(u_7)=v_6$.

P690 15

a) {*a, b, f*} and {*c, d, e*}

b) {*a, b, c, d, e, h*}, {*f*} and {*g*}

c) {*a, b, d, e, f, g, h, i*} and {*c*}

P692 41

A minimal set of people who influence the others. The vertex basis in the influence graph is {Deborah}.

P705 29

1) 1 time. The path can be: *a,b,c,d,e,b* and *a,c.*

2) 0 times. The path can be: *b,a,d,b,e,d,g,h,f,i,h,e,f,c, b.*

3) 0 times. The path can be: *a,c,e,c,d,e,a,b,e,b,d.*

4) 0 times. The path can be: *f,e,a,f,b,a,d,e,c,d,b,c.*

5) 0 times. The path can be: *a,e,a,b,b,e,d,b,c,d,c,e,a.*

6) 0 times. The path can be: *b,a,i,b,c,i,h,a,d,e,f,d,g,i, d,c.*

7) 0 times. The path can be: *a,b,i,a,c,i,h,b,c,g,f,e,d,h,e, c,d,g,h,a.*

P705 35

No Hamilton circuit exists.

Because each edge incident to a vertex of degree 2, so if a Hamilton circuit exists, the circuit will include every edge. Meanwhile, there are exactly two vertices of degree 3, so there is a Euler path, which means no Hamilton circuit exists.

## P716 5

2) The shortest path is *a,b,e,d,z* and the shortest length is 7.

3) The shortest path is *a,c,d,e,g,z* and the shortest length is 16.

4) The shortest path is *a,b,e,h,l,m,p,s,z* and the shortest length is 16.

## P718 27

The route with the least airfare is Los Angeles, San Francisco, Denver, Detroit, New York and Los Angeles.

The total airfare is 1045 dollars.

P725 15

The graph has no loops or multiple edges, so the degree of each region is at least 4. Hence we have $2e \geq 4r = 4(e-v+2)$, then we have $e \leq 2v-4$.

P726 23

If we remove *d* and *h* with their incident edges, the subgraph we get is not homeomorphic to $K_{3,3}$.

So the given graph is planar.