
Solutions

Solutions to Chapter 2 Exercise

1. Graph 2.9 contains:
 - (a) 13 vertices
 - (b) 17 edges
 - (c) 5 multiple edges
 - (d) 2 loops
 - (e) 3 vertices adjacent to vertex a
 - (f) 8 vertices connected to vertex a
2. The graph induced by...
 - (a) vertices $\{a, b, c, d, e\}$ should contain vertices $\{a, b, c, d, e\}$ and edges $\{(a, b), (a, c), (a, d), (c, c), (b, e)\}$.
 - (b) edges $\{x, y, z\}$ should contain vertices $\{g, j, k, l\}$ and edges $\{(g, j), (g, k), (j, l)\}$.
3. Graphs Y and Z are isomorphic. One possible isomorphism is given in Table 13.2. Graphs Y and Z are not automorphic.
4. A planar clique of size...
 - (a) 4 can exist.
 - (b) 5 cannot exist.

TABLE 13.2: One possible isomorphism of graphs Y and Z .

$V(A)$	$V(B)$
a	d
b	b
c	f
d	a
e	e
f	c

- (c) 6 cannot exist.
5. Given an undirected tree...
- (a) it is possible to draw a directed tree with the same number of vertices and edges.
 - (b) it is not possible to draw a new undirected tree with the same number of vertices but a different number of edges.
 - (c) it is not possible to add an edge to the tree without creating a cycle.
 - (d) it is not possible to remove an edge from the tree without disconnecting at least one vertex.

Solutions to Chapter 3 Exercises

1.

```
1 > library(stats)
2 > summary(m.age)
3   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
4  15.70  17.20   20.60   21.51  24.90   30.40
5 > sd(m.age)
6 [1] 4.83385
7 > var(m.age)
8 [1] 23.36610
```
2. Figure 13.20 displays the solution.
3. (a) $4 + y$
 (b) $y - x$
 (c) $sum(y)$
 (d) $x * y$
 (e) $y[1 : 5]$
4. (a) $seq(1, 10, by = 2)$
 (b) $seq(2, 10, by = 2)$
 (c) $seq(10, 1, by = -1)$
 (d) $seq(1, 10, by = 2)^3$
5. (a) $\mathbf{A} + \mathbf{B} = \begin{pmatrix} 9 & 11 \\ 10 & 7 \end{pmatrix}$
 (b) $\mathbf{A} + 3*\mathbf{B} = \begin{pmatrix} 23 & 23 \\ 14 & 13 \end{pmatrix}$