1. g(a) = (1, 2)

g(b) = (2, 2)

g(c) = (2, 3)

g(d) = (1, 3)

1. a. The graph is simple.

b. The graph is not complete.

c. The graph is connected.

d. 3 -> 5 -> 6

3 -> 4 -> 5 -> 6

e. yes 3 -> 4 -> 5 -> 3

f. yes, the edge would be a5.

g. yes, the removal of edge a1 will make the graph not connected.

5.

9. a. This implies that the IT and the marketing department only associate with people who are in the same department as them.

b. Carl and Fletcher are not acquainted. SiuYin is acquainted with one person.

c. The degree of separation between Carl and Yuri is 2.

13. Graph b is not isomorphic because graphs a and c have an isolated vertex, while this graph does not have an isolated vertex.

30. Euler’s formula: 4 \* n = 2 \* 12

n = 6

n – a + r = 2

6- 12 + r = 2

r = 8

49. The graph that would have the identity matrix is a graph with isolated vertices that only has loops no edges.

50. The graph whose adjacency matrix is 0n would be a graph with only isolated vertices, no edges.

51. For a simple, complete graph with n nodes, the adjacency matrix would have a diagonal of zeros and the rest of the spots would have ones because there is a path between every two vertices but there are no parallel edges and loops.

65.

71. The adjacency matrix for g prime would have the ones replaced with zeros and the zeros replaced with ones; however, the diagonal zeros would remain the same.