Please refer to the corresponding exercise sections in the textbook (Rosen, 7th edition). Justify all answers in order to receive full credit.

1. Graphs and Graph Models (page 650)

(1) (1.5 points) 10 for exercises 5, 6, 7

2. Graph Terminology and Special Types of Graphs

(1) (3.5 points) For the graph $G_1$:
(a) Specify the set of vertices $V$.
(b) Specify the set of edges $E$.
(c) Give the degree for each vertex.
(d) Verify that the handshaking lemma holds.
(e) Draw the directed graph that can be used to represent this undirected graph.
(f) Give the adjacency matrix representation for this graph. (Assume vertices are sorted lexicographically.)
(g) Give the adjacency list representation for this graph.

(2) (3 points) For the graph $G_2$:
(a) Specify the set of vertices $V$.
(b) Specify the set of edges $E$.
(c) Give the in-degree and the out-degree for each vertex.
(d) Verify that the handshaking lemma holds.
(e) Give the adjacency matrix representation for this graph. (Assume vertices are sorted lexicographically.)
(f) Give the adjacency list representation for this graph.

Continued on the back
3. Connectivity (page 689)

(1) (1.5 points) 6

4. Introduction to Trees (page 755)

(1) (1.5 points) 2 c,d,e (justify your answers)
(2) (4.5 points) 4 a-h, and i below:
   i) List the vertices at level 2.
(3) (4.5 points) Use (strong) induction on \( l \) to show that for all \( l \geq 1 \), a full binary tree with \( l \) leaves has \( 2l - 1 \) vertices total.