## Exercise 6 for Trees \& Graphs

1. In Figure1
a) Which node is the root?
b) Which nodes are leaves?
c) Name the parent node of J;
d) List the siblings of H ;
e) List the left child of node E;
2. In Figure 1
a) Give the level of node I ;
b) Give the depth of the tree;
c) List the subtree whose root is E.
3. Give the pre-order, in-order, post-order, levelorder tree traversal sequences for the expression tree in Figure 2.
4. Give the array-based tree representation of Figure 2.
5. Show that in a binary tree of N nodes, there are $\mathrm{N}+1 \boldsymbol{N} \boldsymbol{L} \boldsymbol{L}$ links representing children.
6. Finding a topological ordering for the graph in Figure 3.
7. Finding the shortest path from A to all other vertices for the graph in Figure 4.
8. Give the adjacency list and adjacency matrix for the undirected graph in Figure 5.
9. Following the stack implementation of DFS and the queue implementation of BFS (see lecture notes), draw a table for each procedure to show the detailed operations of DFS and BFS for the graph in Figure 5. The start point is A.


Figure 1


Figure 2


Figure 3


Figure 4


Figure 5

