Exercises on Graphs

1. Draw an undirected graph with five edges and four vertices. The vertices should be called 0, 1, 2 and 3 and there must be a path of length three from 0 to 3.

2. Draw the directed graph that corresponds to this adjacency matrix:

0 1 2 3

0 | 0 0 1 0 |

1 | 1.0 0 0 0 |

2 | 0 0 0 1.0|

3 | 1.0 0 0 0 |

Specify the edges in this graph. Is this graph an acyclic graph?

3.

For the graphs given above:

1. Specify the vertices and the edges.

2. In each graph, specify what vertices are adjacent to (i) vertex 0 and (ii) vertex 3

3. Show how the graphs would be represented using (i) adjacency matrix and (ii)

adjacency lists.

4. Has the first graph any cycles?

5. The second graph is a directed graph. Is it acyclic or not? i.e. has it any cycles?

6. Trace the breadth-first traversal algorithm as applied to the graphs given above with 0 as the starting vertex.

You should show how the queue contents change as the graph is being processed. What is the visit sequence of the vertices?

7. Trace the depth-first traversal algorithm with 0 as the starting vertex.

You should show the sequence of recursive calls and the sequence of preorder-process and postorder-process of the vertices.

What is the preorder visit sequence of the vertices? What is the postorder visit sequence of the vertices?

8. Repeat Q.6 and Q.7 for the undirected graph with 6 as the starting vertex.