

CSE 373 Spring 2013: Ch 9 Practice Problems

- Do Problem 9.1 in Weiss to find a topological ordering for the graph of Figure 9.81. Use a queue for this problem. Show the queue, the selected node, its adjacent nodes, and the change(s) of indegrees to zero at each step. Assume the adjacency lists are in alphabetical order. Show final topological order at the end.

Step 1. Queue: s; Select s; Adjacent to A, D, G; indegree(G) \leftarrow 0

Step 2. ...

- Do Problem 9.5 in Weiss using the graph of Figure 9.82.
 - Use the Dijkstra Algorithm to find the shortest path (and shortest distance) from node A to all other nodes. At each step show the distance from A to each node so far, the selected node, and what nodes are adjacent to it. At the end, show the final distances plus the paths on the graph.

A	B	C	D	E	F	G
0	inf	inf	inf	inf	inf	inf

A is selected. It is adjacent to B and C.

A	B	C	D	E	F	G
0	5	3	inf	inf	inf	inf

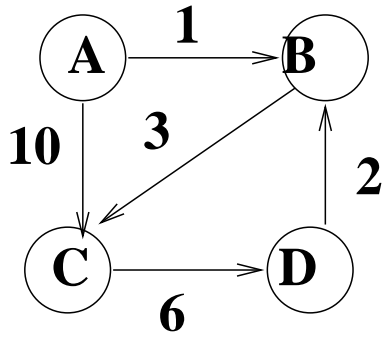
- Use the unweighted shortest path algorithm (Figure 9.16) (Lecture 15, Slide 34) that uses a breadth-first search to find the shortest unweighted path (and distance) from node A to all other nodes. At each step show the selected node, the adjacent nodes, and the values of dist, known, and path for each node.

node	A	B	C	D	E	F	G
dist	0	inf	inf	inf	inf	inf	inf
known	f	f	f	f	f	f	f
path							

Step 1. Select node A. Adjacent to B and C.

node	A	B	C	D	E	F	G
dist	0	1	1	inf	inf	inf	inf
known	t	f	f	f	f	f	f
path		A	A				

Step 2. Select node B.



3. Apply the Floyd-Warshall algorithm (lecture 17, slide 29) to the above graph to obtain a matrix of the costs of all shortest paths from every node to every other node. Use 99 for infinity. Show the initial array representation and the intermediate arrays for each step.
4. Find spanning trees for the graph of Figure 9.84 using
 - (a) Prim's algorithm for minimal spanning tree (show each step)
 - (b) Kruskal's algorithm for minimal spanning tree (show each step)
 - (c) DFS for any spanning tree (start with A)
 - (d) BFS for any spanning tree (start with A)