Homework-10

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1 Homework solution

Task 1

Question: For the directed graph given below, list the node labels in (a) breadth-first search (BFS) and (b) depth-first search (DFS) order starting from node a. There may be more than one solution to this problem, so do not try to enumerate every single one of them. One solution for each of the DFS and BFS ordering is sufficient.

Solution:

(a) Breadth-first search (BFS)

Node visited: a; Queue: a

Node visited: b; Queue: a, b

Node visited: d; Queue: a, b, d

Node visited: b; Queue: a, b, d

Node visited: c; Queue: a, b, d, c

Node visited: h; Queue: a, b, d, c, h

Node visited: d; Queue: a, b, d, c, h

Node visited: e; Queue: a, b, d, c, h, e

Node visited: f; Queue: a, b, d, c, h, e, f

Node visited: c; Queue: a, b, d, c, h, e, f

Node visited: h; Queue: a, b, d, c, h, e, f

Node visited: g; Queue: a, b, d, c, h, e, f, g

Node visited: i; Queue: a, b, d, c, h, e, f, g, i

Node visited: e; Queue: a, b, d, c, h, e, f, g, i

Node visited: f; Queue: a, b, d, c, h, e, f, g, i

Node visited: g; Queue: a, b, d, c, h, e, f, g, i

Node visited: c; Queue: a, b, d, c, h, e, f, g, i

Node visited: h; Queue: a, b, d, c, h, e, f, g, i

(b) Depth-first search (DFS)

Node visited: a; Queue: a

Node visited: b; Queue: a, b

Node visited: c; Queue: a, b, c

Node visited: h; Queue: a, b, c, h

Node visited: g; Queue: a, b, c, h, g

Node visited: c; Queue: a, b, c, h, g

Node visited: g; Queue: a, b, c, h, g

Node visited: h; Queue: a, b, c, h, g

Node visited: i; Queue: a, b, c, h, g, i

Node visited: g; Queue: a, b, c, h, g, i

Node visited: i; Queue: a, b, c, h, g, i

Node visited: h; Queue: a, b, c, h, g, i

Node visited: c; Queue: a, b, c, h, g, i

Node visited: b; Queue: a, b, c, h, g, i

Node visited: g; Queue: a, b, c, h, g, i

Node visited: b; Queue: a, b, c, h, g, i

Node visited: a; Queue: a, b, c, h, g, i

Node visited: d; Queue: a, b, c, h, g, i, d

Node visited: c; Queue: a, b, c, h, g, i, d

Node visited: d; Queue: a, b, c, h, g, i, d

Node visited: e; Queue: a, b, c, h, g, i, d, e

Node visited: f; Queue: a, b, c, h, g, i, d, e, f

Node visited: e; Queue: a, b, c, h, g, i, d, e, f

Node visited: d; Queue: a, b, c, h, g, i, d, e, f

Node visited: f; Queue: a, b, c, h, g, i, d, e, f

Node visited: d; Queue: a, b, c, h, g, i, d, e, f

Node visited: a; Queue: a, b, c, h, g, i, d, e, f

Task 2

Question: Given the graph below, fill in the table below with the execution steps of Dijkstra's weighted shortest path algorithm starting from node S.

Solution:

Step	Visited nodes	Dist values for nodes in U
1	-	(0,S)
2	(S,0)	(4,G), (11,H), (33,P)
3	(S,0), (G,4)	(10,R), (11,H), (11,P)
4	(S,0), (G,4), (R,10)	(11,H), (11,P), (13,A)
5	(S,0), (G,4), (R,10), (H,11)	(11,P), (13, A)
6	(S,0), (G,4), (R,10), (H,11), (P,11)	(13, A)
7	(S,0), (G,4), (R,10), (H,11), (P,11), (A,13)	