

	A	B	C	D	E	F	G	H	I
1	0/nil	00/nil							
2	0/nil	15/A	13/A	5/A	00/nil	00/nil	00/nil	00/nil	00/nil
3	0/nil	15/A	13/A	5/A	9/D	00/nil	00/nil	00/nil	24/D
4	0/nil	15/A	12/E	5/A	9/D	10/E	18/E	00/nil	23/E
5	0/nil	15/A	12/E	5/A	9/D	10/E	18/E	27/F	23/E
6	0/nil	14/C	12/E	5/A	9/D	10/E	18/E	27/F	23/E
7	0/nil	14/C	12/E	5/A	9/D	10/E	18/E	25/B	23/E

Q2

True we prove that by disproof method. If there is a path  $SP'$  shorter than  $SP$ , and different from  $SP$ , because  $G$  is an undirected graph.  $SP'$  is one of shortest path from A to X.

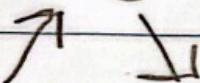
Q<sub>3</sub>

① 5 2 4 | 6 3 9 7 8

② 2 5 4 | 6 3 9 7 8

③ 5 2 6 4 | 3 9 7 8

①



③ ← ②

Q 5

We predefine the distance to all vertex to inf, if there are two disconnected parts in graph G, the found of nearest unvisited node will return an inf value, the weight of generated min spanning tree will be inf.

Q6

1. Incorrect

$$A \rightarrow B \xrightarrow{C} D$$

2. Incorrect

$$A \rightarrow C \\ B \nearrow$$

3. Incorrect

$$A \rightarrow B \xrightarrow{C} \\ D \nearrow$$

4. correct

If there is a hamiltonian path, we can get a path that

include all vertexes. the path is a typological sorting. For an element  $v_i$  in hamiltonian path the position of  $v_i$  is  $i$  in any other typological sorting. For there is a path between  $v_0 \sim v_{i-1}$  to  $v_i$  and a path from  $v_i$  to  $v_{i+1} \dots v_n$ .

4

Yes if the final distance array

contains inf, that node is disconnected

Algorithm complexity

dijkstra  $O(n^2)$

DFS  $O(m)$

BFS  $O(m)$

Disjoint-set  $O(m)$