CSPB 3104 - Park - Algorithms

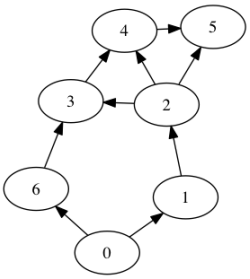
Started on	Wednesday, 13 March 2024, 10:23 PM
State	Finished
Completed on	Wednesday, 13 March 2024, 10:27 PM
Time taken	4 mins 24 secs
Marks	28.00/28.00
Grade	**10.00** out of 10.00 (**100**%)

Question **1**

Correct

Mark 10.00 out of 10.00

This question concerns the graph shown below:



Suppose we run a breadth-first seach (BFS) starting from the node 0. When BFS explores the adjacent nodes for a given node, it does so in increasing order of the node IDs.

Write down the order in which the nodes are visited.

For example, you may write 0,1,2,3,4,5,6 to specify that the node 0 is visited first followed by the node 1, and so on until the node 6. Please do not use whitespaces in the answer.

0,1,6,2,3,4,5

Which of the following edges belong to the BFS tree? Write YES if the edge belongs to the tree and NO otherwise.

6 -> 3 YES

2 -> 3 NO

3 -> 4 NO

2 -> 5 YES

What is the shortest path found by BFS from node 0 to node 5? *Write down the sequence of nodes (including 0 and 5) separated by a , (comma). Do not add any whitespaces in your answer.*

0,1,2,5

Correct

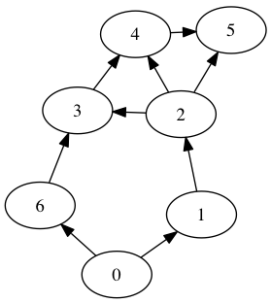
Marks for this submission: 10.00/10.00.

Question **2**

Correct

Mark 5.00 out of 5.00

Consider the graph shown below and assume we perform a DFS traversal of the graph.



Now we perform a depth first search starting from node 0. Every time we consider adjacent nodes, we do so in the increasing order of their node ids.

Select the correct sequence of DFS visits from the lists below.

What is the first node visited by the DFS?	0
What is the second node visited by the DFS?	1
What is the third node visited by the DFS?	2
What is the fourth node visited by DFS?	3
What is the fifth node visited by the DFS?	4

Your answer is correct.

The correct answer is: What is the first node visited by the DFS? → 0, What is the second node visited by the DFS? → 1, What is the third node visited by the DFS? → 2, What is the fourth node visited by DFS? → 3, What is the fifth node visited by the DFS? → 4

Correct

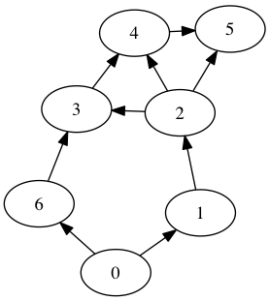
Marks for this submission: 5.00/5.00.

Question **3**

Correct

Mark 9.00 out of 9.00

Consider again the graph shown below:



Suppose we perform a DFS starting from node 0 and for any node, visit the children in increasing order of their node IDs. For the edges below, write TREE if they are tree edges, BACK if they are back edges, FWD for forward edges and CROSS for cross edges.

0 -> 1 TREE

1 -> 2 TREE

2 -> 3 TREE

0 -> 6 TREE

6 -> 3 CROSS

3 -> 4 TREE

2 -> 4 FWD

2 -> 5 FWD

4 -> 5 TREE

Correct

Marks for this submission: 9.00/9.00.

Question **4**

Correct

Mark 4.00 out of 4.00

Suppose we carried out a DFS on a graph and obtained the following discovery and finish times for the nodes.

Node ID	Discovery Time	Finish Time
1	1	14
2	2	13
3	3	8
4	4	5
5	6	7
6	9	12
7	10	11

Note that the table above corresponds to the following sequence of dfsVisits and returns.

```
dfsVisit(1) -> dfsVisit(2) -> dfsVisit(3) -> dfsVisit(4) -> return(4) -> dfsVisit(5) -> return(5) -> return(3) ->
dfsVisit(6) -> dfsVisit(7) -> return(7) -> return(6) -> return(2) -> return(1)
```

For each of the possible edges shown below select the option that is true.

(1,2):

- The edge cannot belong to the graph
- (●) The edge definitely belongs to the graph and is a tree edge Correct
- The edge may belong to G and is a forward edge if it existed
- The edge may belong to the graph and is a back edge if it existed

Mark 1.00 out of 1.00

The correct answer is: The edge definitely belongs to the graph and is a tree edge

(6,7):

- The edge cannot belong to the graph
- The edge may belong to G and would be a forward edge
- The edge may belongs to the graph and would be a back edge
- (●) The edge definitely belongs to the graph and is a tree edge Correct

Mark 1.00 out of 1.00

The correct answer is: The edge definitely belongs to the graph and is a tree edge

(5,6):

- (●) The edge cannot belong to the graph Correct
- The edge may belong to G and is a forward edge
- The edge may belong to the graph and would be a back edge
- The edge definitely belongs to the graph and is a tree edge

Mark 1.00 out of 1.00

The correct answer is: The edge cannot belong to the graph

(4,2):

- The edge cannot belong to the graph
- The edge may belong to G and would be a forward edge
- The edge may belong to the graph and would be a back edge Correct
- The edge definitely belongs to the graph and is a tree edge

Mark 1.00 out of 1.00

The correct answer is: The edge may belong to the graph and would be a back edge

Correct

Marks for this submission: 4.00/4.00.