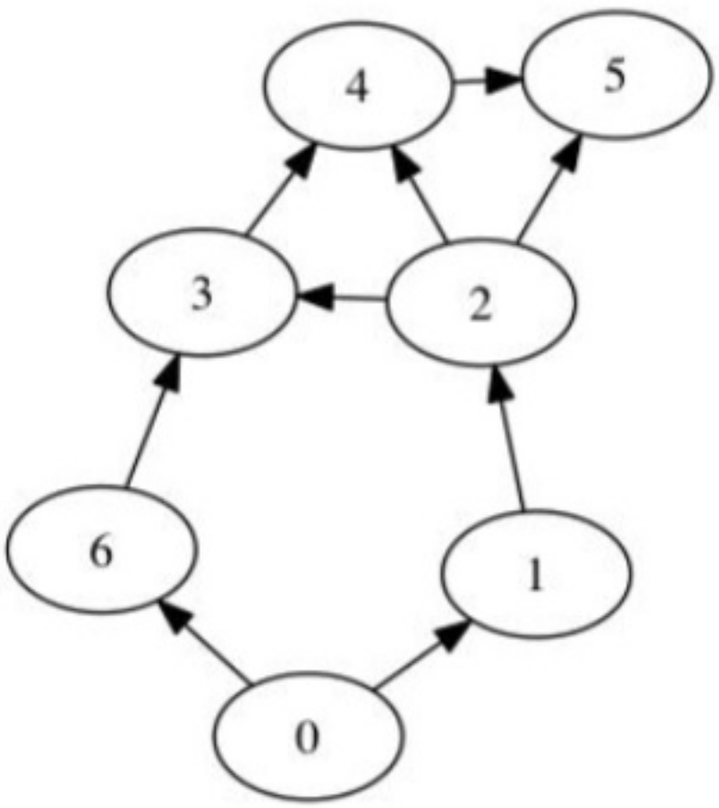
1. Consider the graph shown below.

1 / 1 point



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

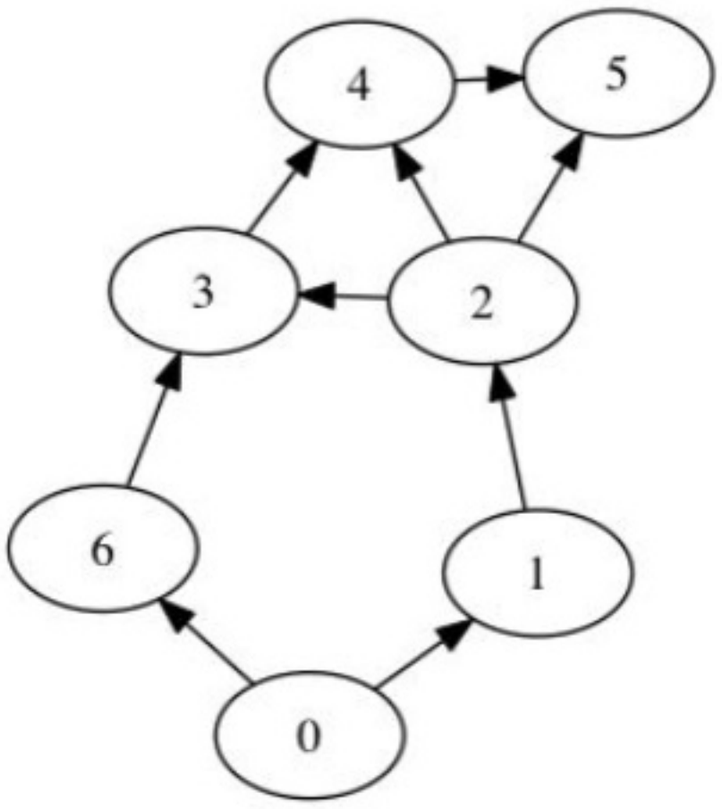
In which order will our DFS visit the nodes?

- ○ $[0, 1, 6, 3, 2, 5, 4]$
- ○ $[0, 1, 6, 2, 3, 4, 5]$
- ◉ $[0, 1, 2, 3, 4, 5, 6]$
- ○ $[0, 6, 3, 4, 5, 1, 2]$

Correct
Correct

2. Consider again the graph shown below.

1 / 1 point



Suppose again that we perform a depth first search of the tree, starting from node 0.

Select all the edges that belong to the DFS tree. Make sure edges not belonging to the tree are not selected.

- [x] $3 \to 4$

  Correct
  Correct

- [x] $2 \to 3$

  Correct
  Correct

- [ ] $2 \to 4$
- [ ] $2 \to 5$
- [ ] $5 \to 6$
- [ ] $6 \to 3$
- [x] $0 \to 1$

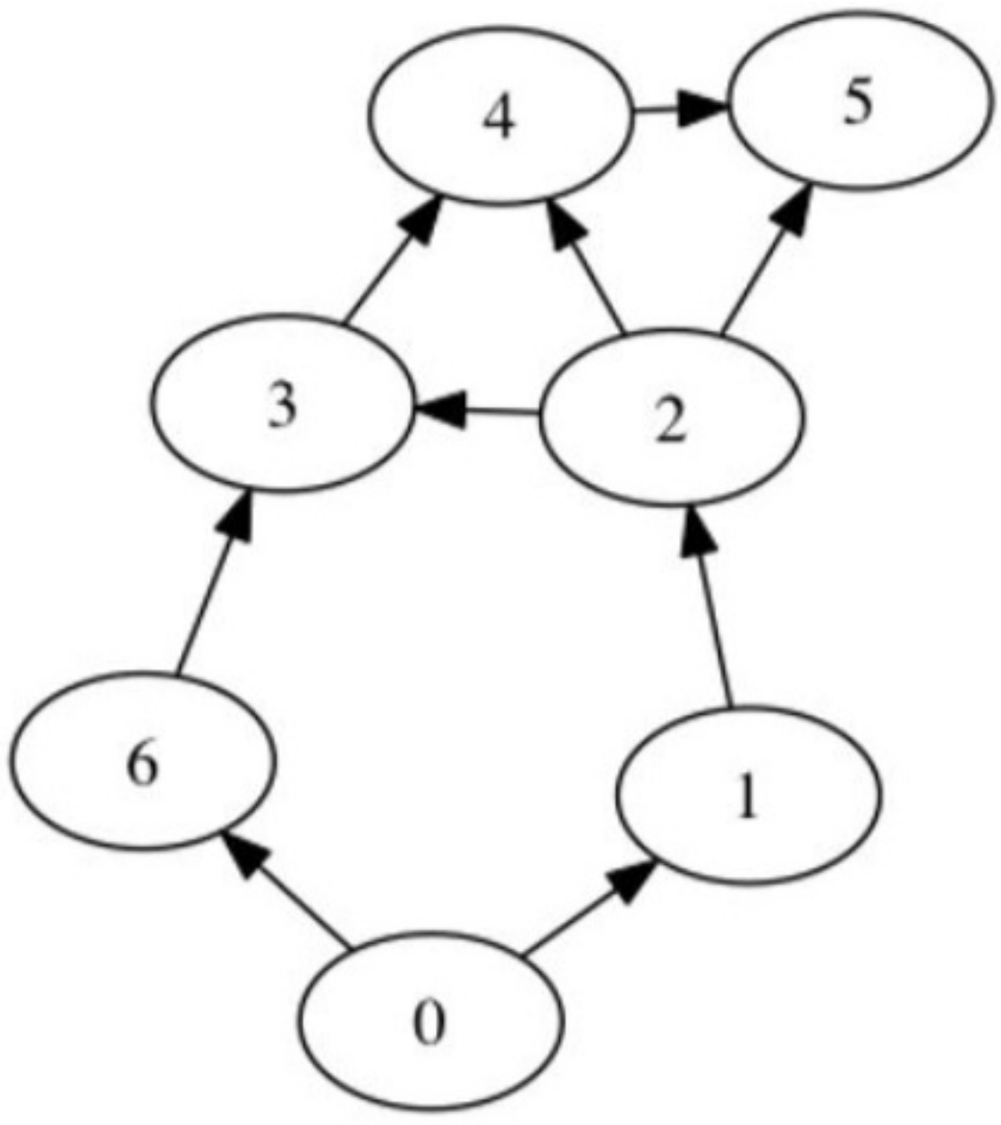
  Correct
  Correct

- [x] $0 \to 6$

  Correct
  Correct

3. Consider again the graph shown below.

1 / 1 point



Suppose we run a breadth first search (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.

Select all the edges that belong to the BFS tree. Make sure no other edges are selected.

- [x] $0 \rightarrow 6$

  Correct
  Correct

- [ ] $2 \rightarrow 3$
- [x] $1 \rightarrow 2$

  Correct
  Correct

- [x] $2 \rightarrow 5$

  Correct
  Correct

- [ ] $3 \rightarrow 4$
- [x] $6 \rightarrow 3$

  Correct
  Correct

- [x] $0 \rightarrow 1$

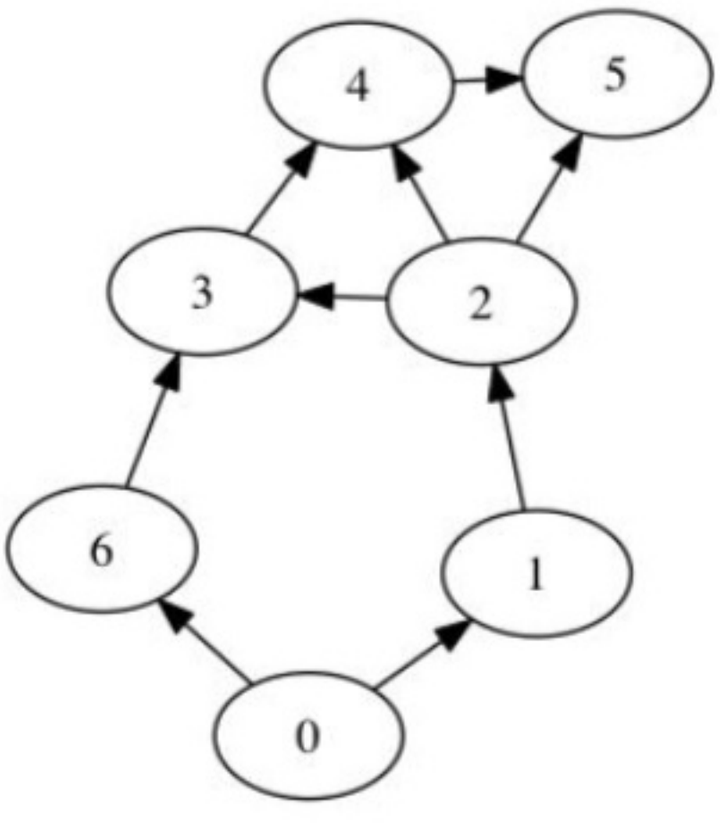
  Correct
  Correct

- [x] $2 \rightarrow 4$

  Correct
  Correct

4. This question concerns the graph shown below:

1 / 1 point



Suppose we perform a depth first search starting from node 0 and for any node, visit the children in increasing order of their node IDs. Select all the correct facts about the DFS tree from the list below. It may help to draw the DFS tree first.

- [x] There are no back edges in the DFS tree.

Correct
Correct.

- [x] The edge $2 \rightarrow 5$ is a forward edge in the DFS tree.

Correct
Correct. 2 will be an ancestor of 4 in the DFS tree which has the edges 2-> 3, 3 -> 4 and 4 -> 5.

- [x] The edge $2 \rightarrow 4$ is a forward edge in the DFS tree.

Correct
Correct. 2 will be an ancestor of 4 in the DFS tree which has the edges 2-> 3 and 3 -> 4.

- [ ] The edge $6 \rightarrow 3$ is a forward edge in the DFS tree.

5. Suppose we carried out a DFS on a mystery graph starting from node 1 and obtained the following discovery and finish times for the nodes.

1 / 1 point

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)

Assume this is a single DFS run, and there is no outer loop that starts a new DFS from each node.

Select all the correct facts we can deduce about the graph from the given information. It helps to sketch the edges that DFS takes pictorially before attempting the questions below.

- [x] The edge $1 \to 2$ definitely belongs to the graph.

Correct
Yes it does since DFS goes from edge 1 to edge 2.

- [ ] The edge $6 \to 7$ does not belong to the graph.
- [x] The edge $5 \to 6$ cannot belong to the graph.

Correct
Correct. If it did then DFS visit for 5 would be immediately followed by a visit to 6. Instead DFS backtracks all the way back to 3 before visiting 6.

- [x] The edge $4 \to 2$ may belong to the graph and if so it would be a backedge of the DFS.

Correct
Correct.

- [ ] The node 7 has no outgoing edges in the graph.
- [ ] The graph has 7 nodes in total.
- [x] The nodes that are reachable by a path starting from node 1 (other than 1 itself) are nodes $2, 3, 4, 5, 6$ and 7.

Correct
That is correct.