Question 1

Answer saved

Marked out of 1.00

.Consider the following adjacency matrix representing a graph with 4 nodes (0, 1, 2, 3):

0 1 0 1

1 0 1 0

0 1 0 1

1 0 1 0

Which of the following is the correct graph representation?

- [ ] a. A graph with 2 edges
- [ ] b. A graph with 6 edges
- [ ] c. A graph with 5 edges
- [x] d. A graph with 4 edges

Question 2

Answer saved

Marked out of 1.00

Consider the following directed graph represented by its adjacency list:

graph.put(0, Arrays.asList(1, 2));

graph.put(1, Arrays.asList(3));

graph.put(2, Arrays.asList(3));

graph.put(3, Arrays.asList());

What will be the output of the following DFS traversal starting from node 0?

dfs(0, visited, graph);

- [x] a. 0 1 3 2
- [ ] b. 0 2 1 3
- [ ] c. 1 0 2 3
- [ ] d. 0 1 2 3

Question 3

Answer saved

Marked out of 1.00

Consider the following Java code snippet to detect a cycle in an undirected graph:

```
public boolean hasCycle(int node, int parent, Set<Integer> visited, Map<Integer, List<Integer>> graph) {
visited.add(node);
for (int neighbor : graph.get(node)) {
if (!visited.contains(neighbor)) {
    if (hasCycle(neighbor, node, visited, graph)) {
            return true;
    }
} else if (neighbor != parent) {
    return true;
}
return false;
}
```

In the context of this code, which of the following statements is TRUE?

- [ ] a. The code works for directed graphs only.
- [x] b. The code works for undirected graphs and detects cycles if any.
- [ ] c. The code cannot detect cycles in graphs.
- [ ] d. The code will throw an error because it doesn't handle visited nodes correctly.

Question 4

Answer saved

Marked out of 1.00

Let G be a simple graph with 20 vertices and 8 components. If we delete a vertex in G, then number of components in G should lie between ___.

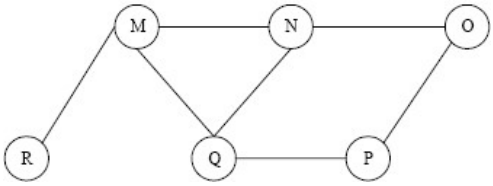
- [ ] a. 7 and 20
- [ ] b. 8 and 20
- [ ] c. 8 and 19
- [x] d. 7 and 19

Question 5

Answer saved

Marked out of 1.00

The Breadth First Search algorithm has been implemented using the queue data structure. One possible order of visiting the nodes of the following graph is



- [ ] a. NQMPOR
- [ ] b. MNOPQR
- [x] c. QMNPRO
- [ ] d. QMNPOR

Question 6

Answer saved

Marked out of 1.00

What is the output of this adjacency list code?

```
Map<String, List<String>> graph = new HashMap<>();
graph.put("A", Arrays.asList("B", "C"));
graph.put("B", Arrays.asList("A", "D"));
graph.put("C", Arrays.asList("A"));
graph.put("D", Arrays.asList("B"));

System.out.println(graph.get("B"));
```

- [ ] a. [D, A]
- [ ] b. [A, C]
- [x] c. [A, D]
- [ ] d. [B, D]

Question 7

Not yet answered

Marked out of 1.00

What traversal algorithm is implemented here?

```
public void traverse(String start) {
Set<String> visited = new HashSet<>();
Queue<String> queue = new LinkedList<>();
queue.add(start);
visited.add(start);

while (!queue.isEmpty()) {
String node = queue.poll();
System.out.print(node + " ");
for (String neighbor : graph.get(node)) {
   if (!visited.contains(neighbor)) {
            queue.add(neighbor);
            visited.add(neighbor);
   }
}
}
}
```

- [ ] a. DFS
- [x] b. BFS
- [ ] c. Dijkstra
- [ ] d. Topological Sort

Question 8

Answer saved

Marked out of 1.00

What does this method do?

```
public boolean Path(String src, String dest, Set<String> visited) {
if (src.equals(dest)) return true;
visited.add(src);
for (String neighbor : graph.get(src)) {
if (!visited.contains(neighbor)) {
    if (Path(neighbor, dest, visited)) return true;
}
}
return false;
}
```

- [x] a. Checks if a path exists using DFS
- [ ] b. Finds shortest path
- [ ] c. Detects a cycle
- [ ] d. Prints the graph

Question 9

Answer saved

Marked out of 1.00

Which scenario causes a cycle in an undirected graph?

- [ ] a. All nodes are visited exactly once
- [x] b. A node connects back to a visited node that is not its parent
- [ ] c. Graph has a node with no outgoing edge
- [ ] d. Graph has a node with degree 1

Question 10

Answer saved

Marked out of 1.00

What is the time complexity of BFS in an adjacency list representation?

- [ ] a. O(V log E)
- [ ] b. O(E log V)
- [ ] c. $O(V^2)$
- [x] d. O(E + V)

Question 11

Answer saved

Marked out of 1.00

What does this method count?

```
public int countComponents() {
Set<String> visited = new HashSet<>();
int count = 0;
for (String node : graph.keySet()) {
if (!visited.contains(node)) {
   dfs(node, visited);
   count++;
}
}
return count;
}
```

- [ ] a. Number of dead ends
- [ ] b. Number of cycles
- [x] c. Number of connected components
- [ ] d. Number of leaf nodes

Question 12

Answer saved

Marked out of 1.00

What is a dead-end node in an undirected graph?

- [ ] a. Node in a cycle
- [ ] b. Node with maximum degree
- [x] c. Node with only one neighbor
- [ ] d. Node with no neighbors

Question 13

Answer saved

Marked out of 1.00

What will this method return for a disconnected graph?

```
public boolean hasCycle(String node, String parent, Set<String> visited) {
visited.add(node);
for (String neighbor : graph.get(node)) {
if (!visited.contains(neighbor)) {
    if (hasCycle(neighbor, node, visited)) return true;
} else if (!neighbor.equals(parent)) {
    return true;
}
}
return false;
}
```

- [ ] a. Only works for directed graphs
- [ ] b. Always detects a cycle
- [x] c. May return false even if there is a cycle in another component
- [ ] d. Only detects self-loops

Question 14

Answer saved

Marked out of 1.00

The following code snippet is the function to insert a string in a trie. Find the missing line.

```
private void insert(String str){
  TrieNode node = root;
  for (int i = 0; i < length; i++){
    int index = key.charAt(i) - 'a';
    if (node.children[index] == null)
      node.children[index] = new TrieNode();
    _____________________
  }
  node.isEndOfWord = true;
}
```

- [ ] a. node = node.children[index++];
- [x] b. node = node.children[index];
- [ ] c. node = node.children[str.charAt(i + 1)];
- [ ] d. node = node.children[index++];

Question 15

Answer saved

Marked out of 1.00

Which of the following is an advantage of adjacency list representation over adjacency matrix representation of a graph?

- [ ] a. In adjacency list representation, space is saved for sparse graphs.
- [ ] b. Adding a vertex in adjacency list representation is easier than adjacency matrix representation.
- [x] c. All of the above
- [ ] d. DFS and BSF can be done in O(V + E) time for adjacency list representation. These operations take O(V^2) time in adjacency matrix representation. Here is V and E are number of vertices and edges respectively.