Lab 8
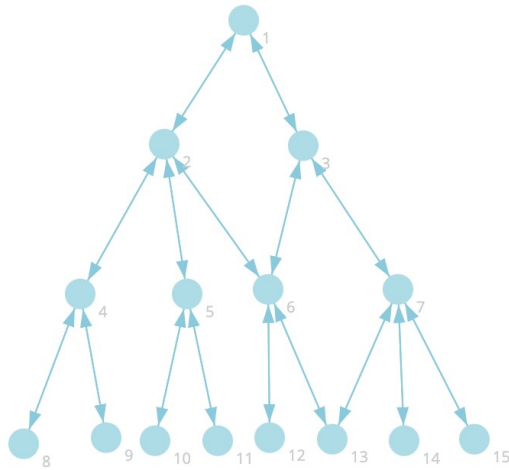**Isa Dzhumabaev**

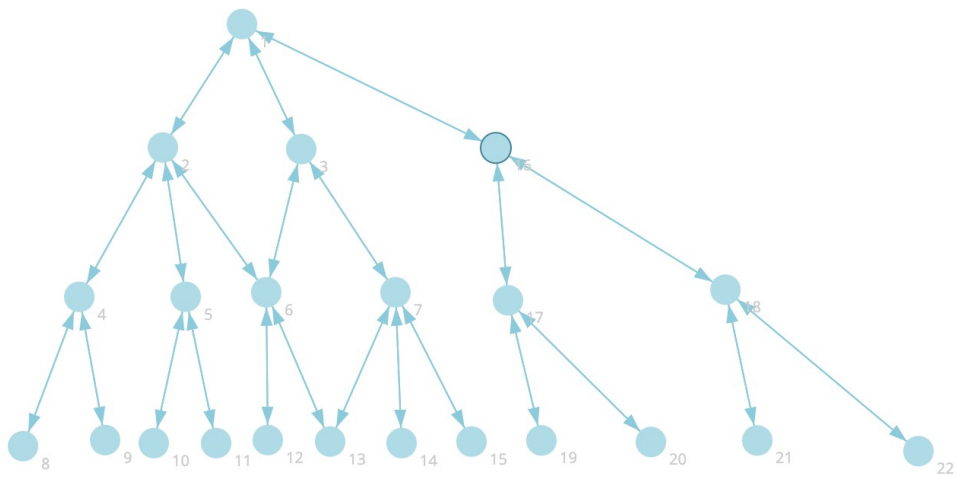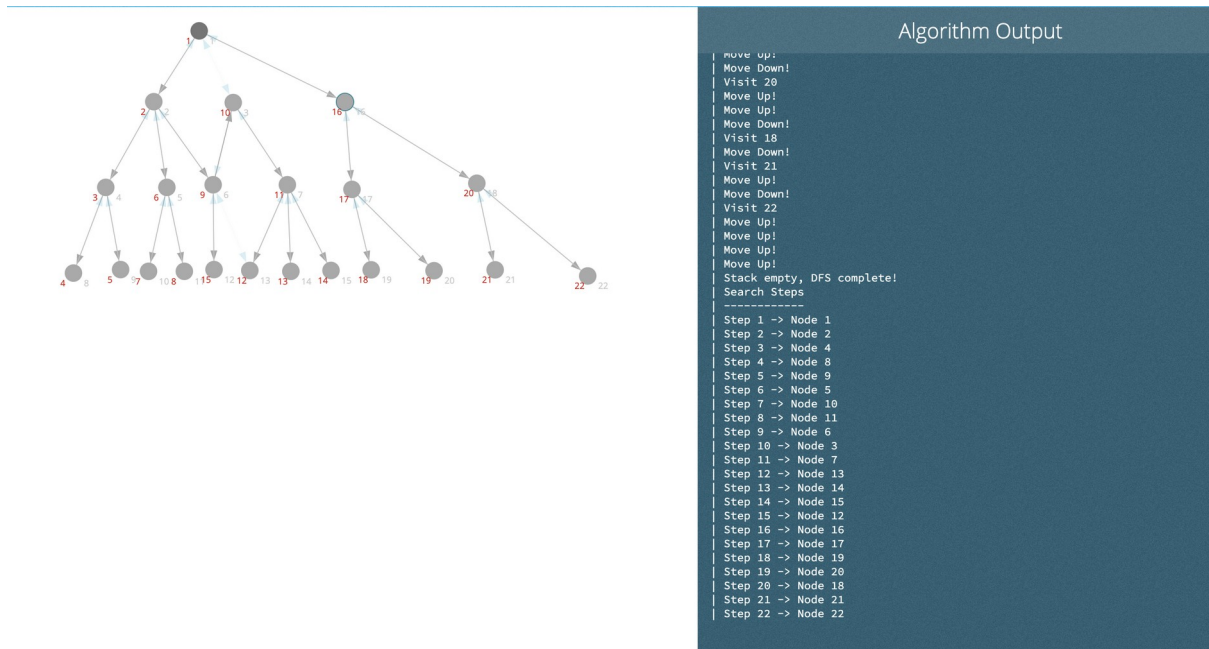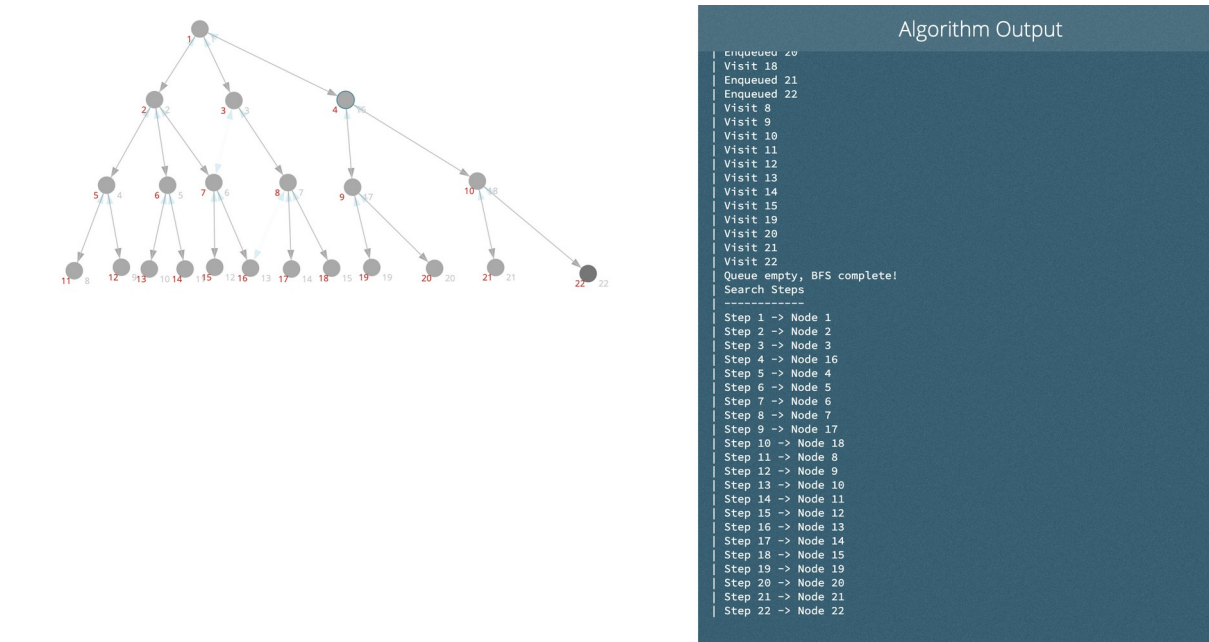# Bipartite

Original:

Modified:

DFS Solution:

A few changes. DFS explores everything as in original graph, bug in the end it also goes to third child of root and explores it.
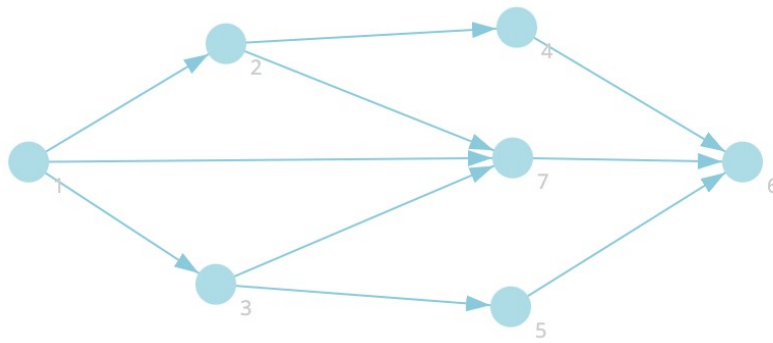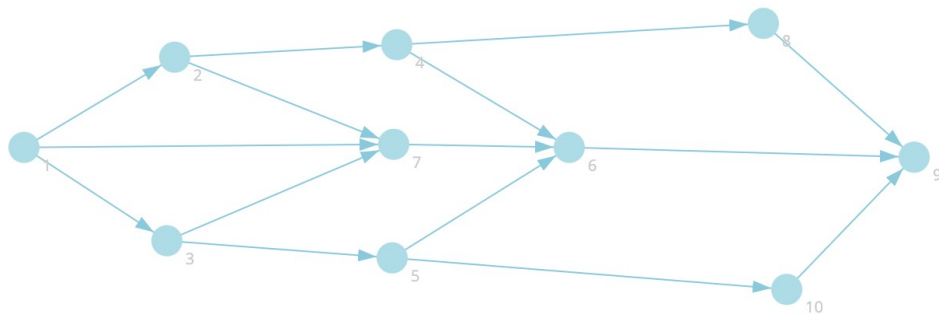
BFS Solution:

The one thing that has changed is third child of root and that is why BFS first explores 3 children of root, in original problem it would go to next depth after second child.
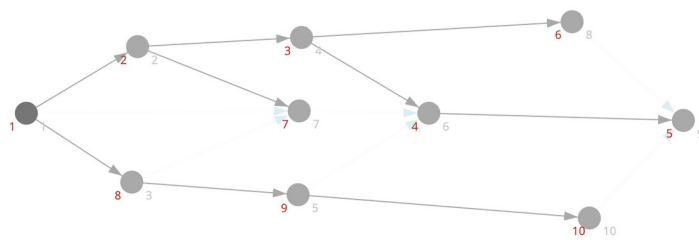
Directed Graph

Original:

Modified:

DFS Solution

```
| Move Down!
| Visit 2
| Move Down!
| Visit 4
| Move Down!
| Visit 6
| Move Down!
| Visit 9
| Move Up!
| Move Up!
| Move Down!
| Visit 8
| Move Up!
| Move Up!
| Move Down!
| Visit 7
| Move Up!
| Move Up!
| Move Down!
| Visit 3
| Move Down!
| Visit 5
| Move Down!
| Visit 10
| Move Up!
| Move Up!
| Move Up!
| Move Up!
| Stack empty, DFS complete!
| Search Steps
| ------------
| Step 1 -> Node 1
| Step 2 -> Node 2
| Step 3 -> Node 4
| Step 4 -> Node 6
| Step 5 -> Node 9
| Step 6 -> Node 8
| Step 7 -> Node 7
| Step 8 -> Node 3
| Step 9 -> Node 5
| Step 10 -> Node 10
```

Changes appeaerd after step 4. In original graph it goes back to node 2 and but here it continues to node 5. After that all path is different.
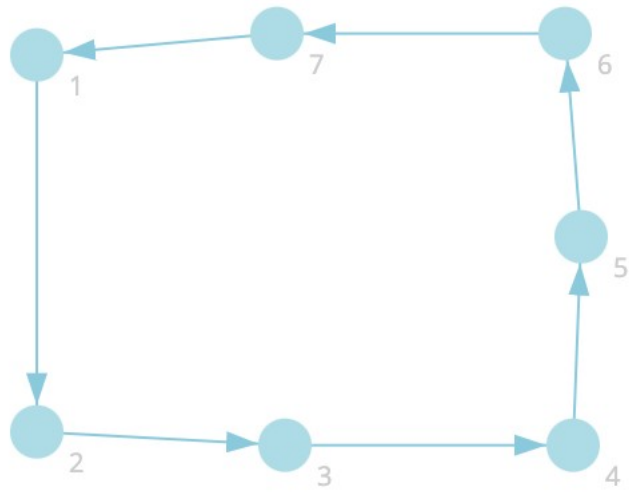
BFS Solution:
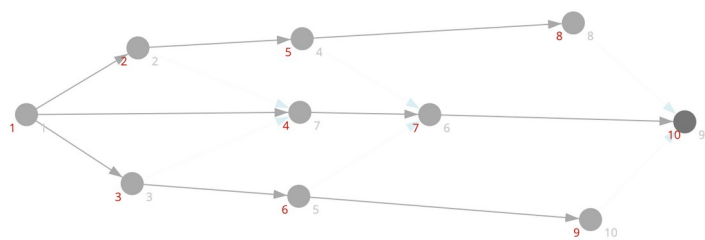
```
| Start at 1
| Enqueued 1
| Visit 1
| Enqueued 2
| Enqueued 3
| Enqueued 7
| Visit 2
| Enqueued 4
| Enqueued 7
| Visit 3
| Enqueued 5
| Enqueued 7
| Visit 7
| Enqueued 6
| Visit 4
| Enqueued 6
| Enqueued 8
| Visit 5
| Enqueued 6
| Enqueued 10
| Visit 6
| Enqueued 9
| Visit 8
| Enqueued 9
| Visit 10
| Enqueued 9
| Visit 9
| Queue empty, BFS complete!
| Search Steps
| ------------
| Step 1 -> Node 1
| Step 2 -> Node 2
| Step 3 -> Node 3
| Step 4 -> Node 7
| Step 5 -> Node 4
| Step 6 -> Node 5
| Step 7 -> Node 6
| Step 8 -> Node 8
| Step 9 -> Node 10
| Step 10 -> Node 9
```
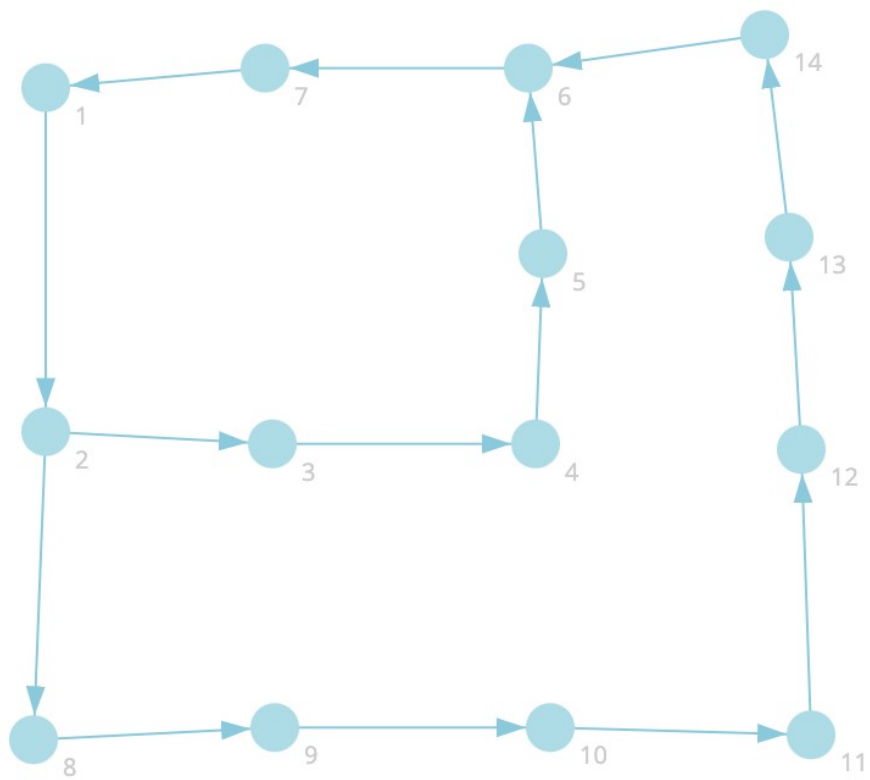
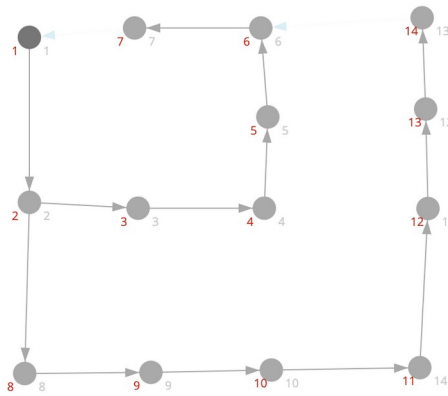Path is same before stp 7, changes after step 7 as there are new nodes.

Directed Cycle

Original:

Modified:

DFS Solution:

Move Up!
Move Down!
Visit 8
Move Down!
Visit 9
Move Down!
Visit 10
Move Down!
Visit 14
Move Down!
Visit 11
Move Down!
Visit 12
Move Down!
Visit 13
Move Up!
Move Up!
Move Up!
Move Up!
Move Up!
Move Up!
Move Up!
Move Up!
Move Up!
Stack empty, DFS complete!
Search Steps

Step 1 -> Node 1
Step 2 -> Node 2
Step 3 -> Node 3
Step 4 -> Node 4
Step 5 -> Node 5
Step 6 -> Node 6
Step 7 -> Node 7
Step 8 -> Node 8
Step 9 -> Node 9
Step 10 -> Node 10
Step 11 -> Node 14
Step 12 -> Node 11
Step 13 -> Node 12
Step 14 -> Node 13

No changes before step 7. After step 7 a new path is just added to original.

BFS Solution:

```
| Enqueued 3
| Enqueued 8
| Visit 3
| Enqueued 4
| Visit 8
| Enqueued 9
| Visit 4
| Enqueued 5
| Visit 9
| Enqueued 10
| Visit 5
| Enqueued 6
| Visit 10
| Enqueued 14
| Visit 6
| Enqueued 7
| Visit 14
| Enqueued 11
| Visit 7
| Visit 11
| Enqueued 12
| Visit 12
| Enqueued 13
| Visit 13
| Queue empty, BFS complete!
| Search Steps
| ------------
| Step 1 -> Node 1
| Step 2 -> Node 2
| Step 3 -> Node 3
| Step 4 -> Node 8
| Step 5 -> Node 4
| Step 6 -> Node 9
| Step 7 -> Node 5
| Step 8 -> Node 10
| Step 9 -> Node 6
| Step 10 -> Node 14
| Step 11 -> Node 7
| Step 12 -> Node 11
| Step 13 -> Node 12
| Step 14 -> Node 13
```

Some significant changes. Right after step 3 BFS goes to node 8 insted of going to node 3 as it did in original graph. All the path after 4 is different from original solution.