CSC 407 Homework ~~7A~~

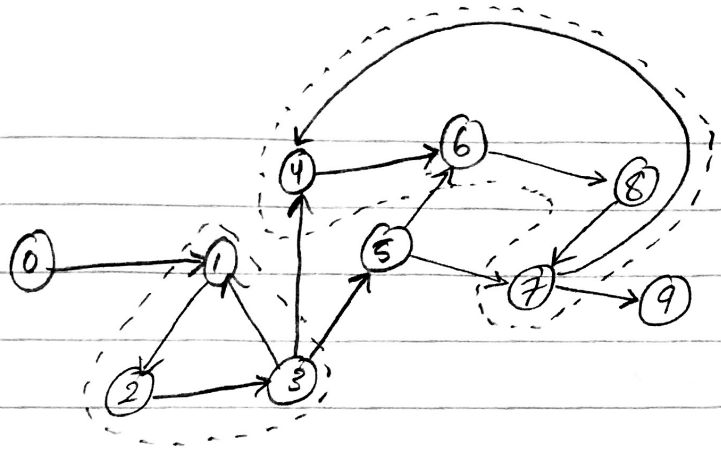
①

0	→ 6 → 2 → 5
1	→ 11 → 8 → 4
2	→ 0 → 6 → 3 → 5
3	→ 2 → 6 → 10
4	→ 8 → 1
5	→ 0 → 2 → 10
6	→ 0 → 2 → 3
7	→ 8 → 11
8	→ 7 → 11 → 1 → 4
9	→
10	→ 5 → 3
11	→ 7 → 8 → 1

②
```
public boolean hasEdge(int v, int w) {
    for (int x : adj[v])
        if (x == w) return true;
    return false;
}
```

③ The BFS tells us nothing about the shortest path between v and w. When neither is at the root as these path lengths are based upon the starting point (root) of the BFS.

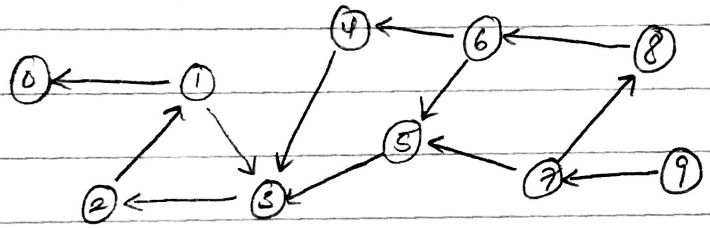
(4)



(5) See dotted lines in (4)

(6) Yes, a path exists ① → ② → ③ → ⑤ → ⑥
(see graph in (4))

(7) Reversed graph:

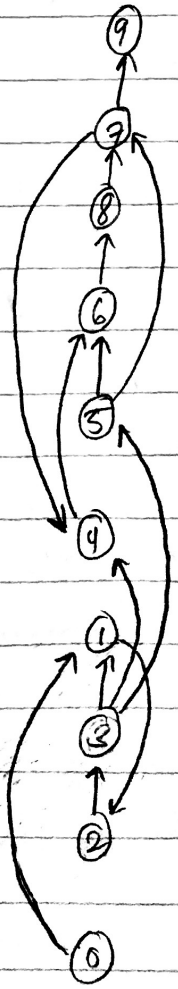


a)

dfs(0)
0 done
dfs(1)
| check 0
| dfs(3)
| | dfs(2)
| | | check 1
| | 2 done
| 3 done
1 done
check 3
dfs(4)
| check 3
4 done

dfs(5)
| check 3
5 done
dfs(6)
| check 4
| check 5
6 done
dfs(7)
| check 5
| dfs(8)
| | check 6
| 8 done
7 done

dfs(9)
| check 7
9 done



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b) dfs(9)
9 done
dfs(7)
check 9
dfs(4)
dfs(6)
dfs(8)
check 7
8 done
6 done
4 done
7 done
check 8
check 6
dfs(5)
check 6
check 7
5 done
check 4
dfs(1)
dfs(2)
dfs(3)
check 1
check 4
check 5
3 done
2 done
1 done
check 3
check 2
dfs(0)
check 1
0 done

8.