

## Homework 4

Nikhil Unni (nunni2)

```
DangerousWalk(G):
  BFS from s, and make  $A = A \cap \text{reach}(s)$ ,  $B = B \cap \text{reach}(s)$ 
  Mark all nodes in G as unvisited
  for each  $u \in A$ 
    if DangerousWalk(u) is dangerous
      output "DANGEROUS"
  output "Safe"
```

2. DangerousWalk(u):

```
  Mark u
  For each edge (u,v) in Out(u)
    If  $v \in A$  or  $v \in (V-A-B)$ 
      If v is not marked
        DangerousWalk(v)
    else
      output dangerous
  output safe
```

The algorithm hinges on the fact that if there is a dangerous walk, it has to be a cycle of only dangerous or normal vertices. So the algorithm is just a DFS starting from each dangerous node, only taking normal or dangerous vertices as next steps. Once we encounter a cycle, we've successfully found a risky path.