

Prob3.

Dijkstra calculate the shortest path for two vertexes, but we want to find the max-probability path for two vertexes. Where x is the start vertex, and y is the end vertex. G is the graph, r is probability set.

Pseudo-code:

Relax(u, v, r)

```
    If  $v.p < u.p * r(u, v)$ :  
         $v.p = u.p * r(u, v)$   
         $v.\pi = u$ 
```

Initialize_single_source(G, x):

```
    For each vertex  $v \in G.V$ :  
         $v.p = 0$   
         $v.\pi = \text{Null}$   
     $x.p = 1$ 
```

Reliability (G, r, x, y)

```
1. Initialize_single_source( $G, x$ )  
2.  $S = \Phi$   
3.  $Q = G.V$   
4. While  $Q \neq \Phi$  do:  
5.      $U = \text{Extract-Max}(Q)$  // v time  
6.      $S = S \cup \{u\}$   
7.     for each vertex  $v \in G.\text{Adj}[u]$  do: // v time  
8.         Relax( $u, v, r$ )  
9.     end for  
10. end while  
11. answer = list<vertex>  
12. answer.push_front( $y$ )  
13. while  $y \neq x$ :  
14.     answer.push_front( $y.\pi$ )  
15.      $y = y.\pi$   
16. end while  
17. answer.push_front( $x$ )  
18. return answer
```