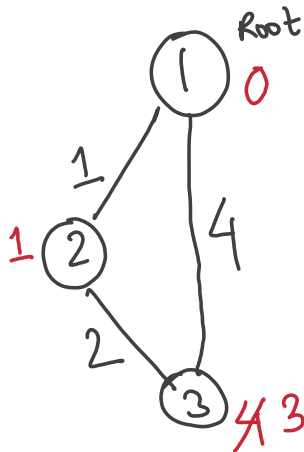


DFS  $\rightarrow$  Shortest Path

$\downarrow$   
~~tree~~  $\mathbb{Z}$  (weighted/unweighted)

BFS  $\rightarrow$  Shortest Path

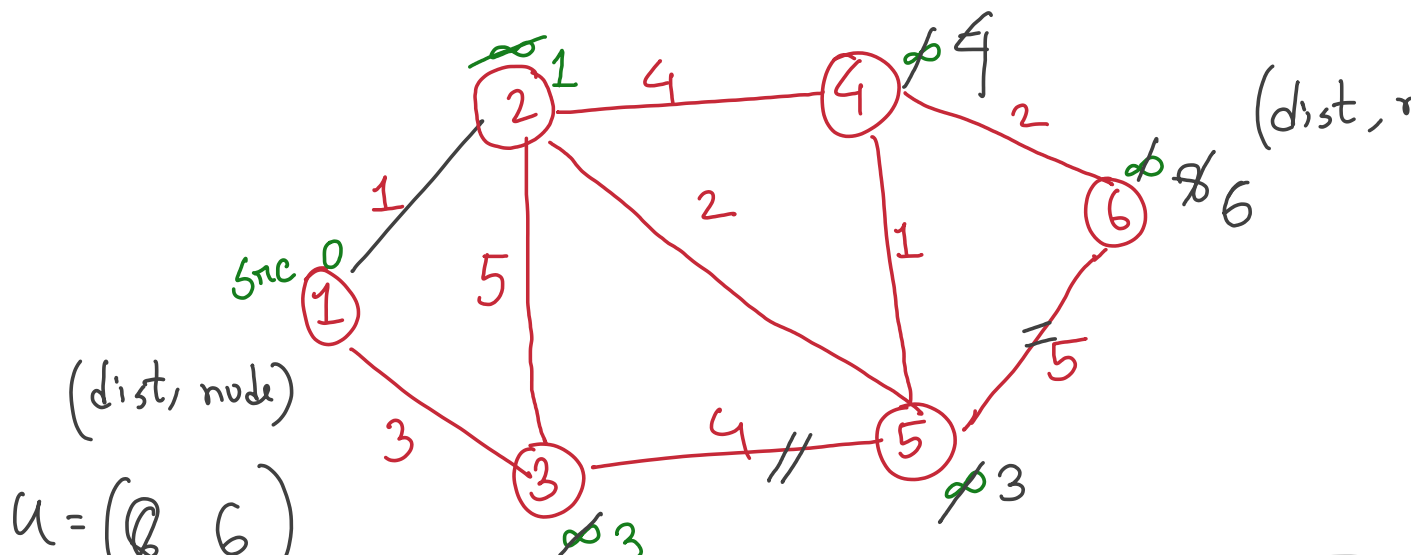


Weighted graph:

- cyclic/acyclic
- various weights
- no negative weights

SP  $\rightarrow$

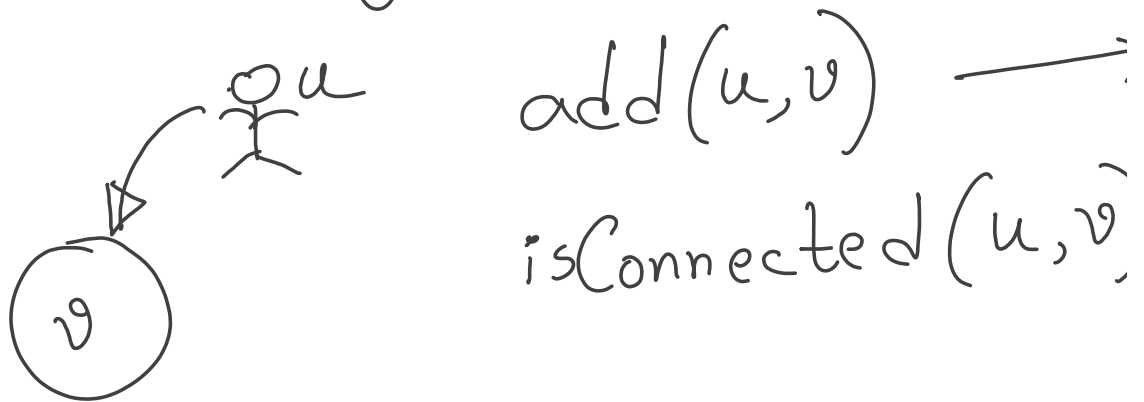
Dijkstra



0, 1

~~(1,2), (3,3), (3,5), (5,4)~~

Inverse Ackermann Function,  
DSU  $\rightarrow$  Disjoint Set Union

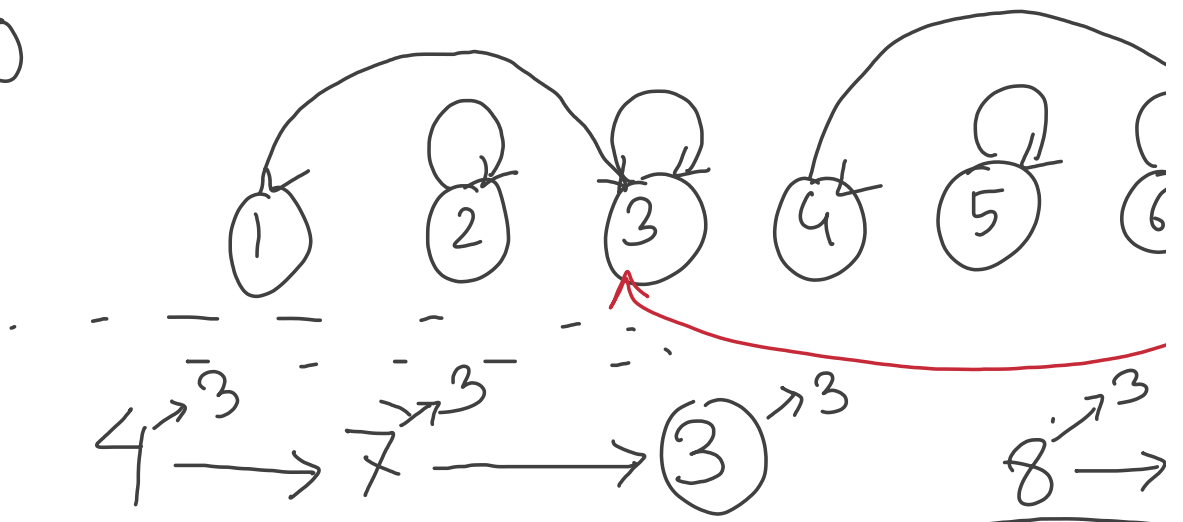


$N = 10^5$   
 $Q = 10^6$

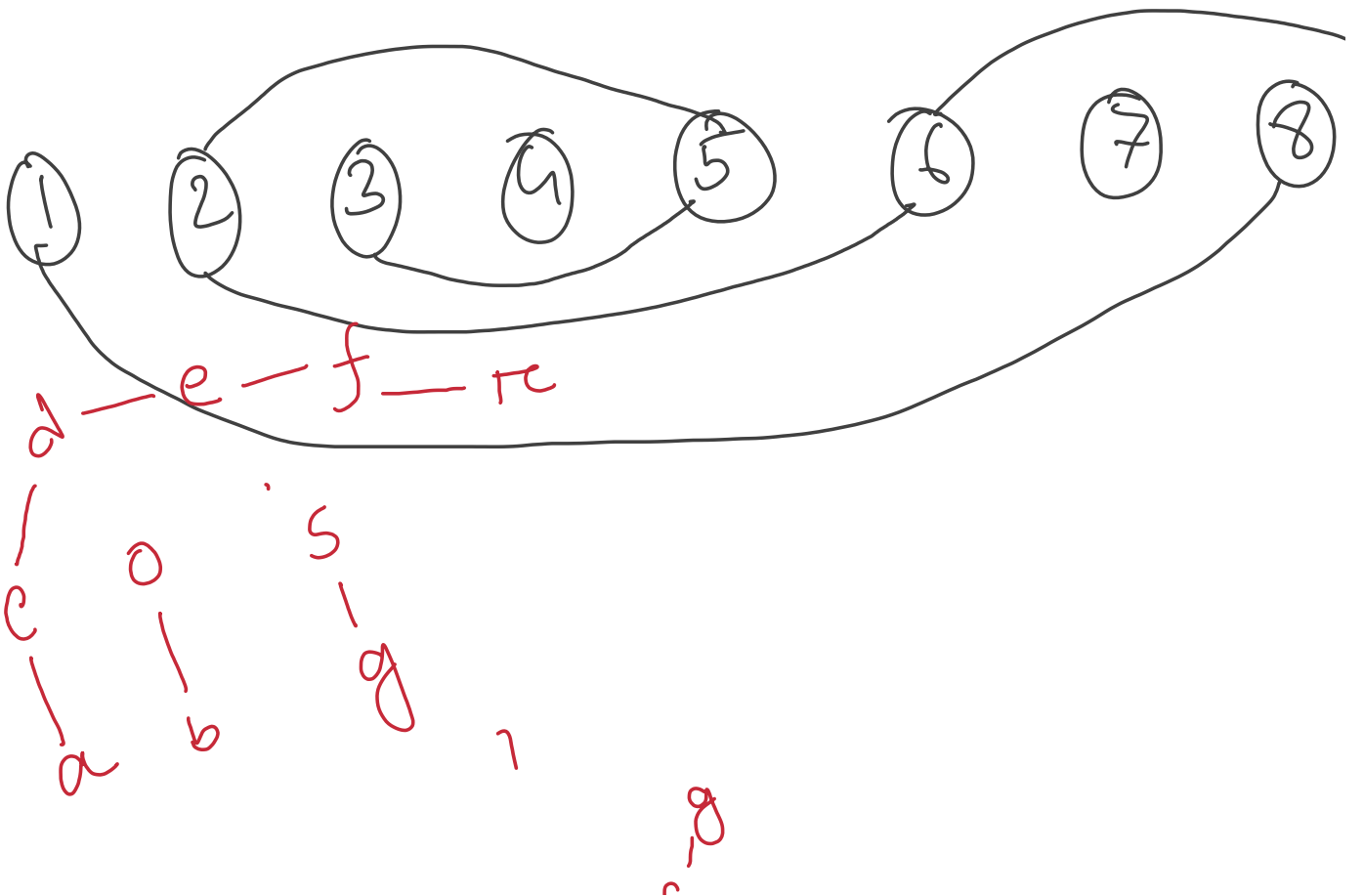
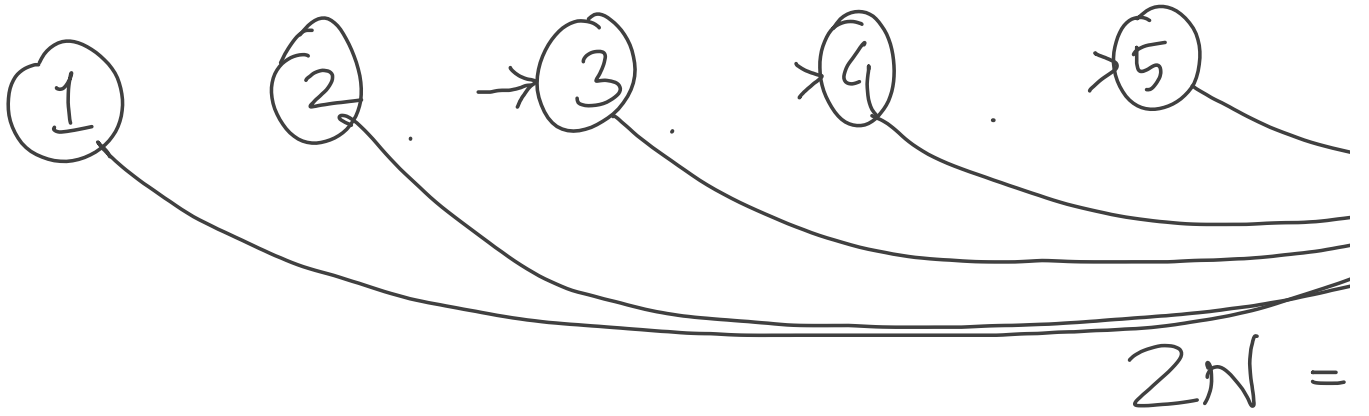


findLeader(  
findLeader(

$N = 10$

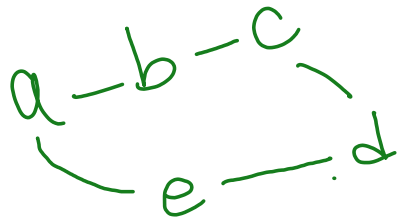


Amortized



~~a, b~~ a, b, c, d, e, f

abced  
bedae



$a \rightarrow b$   
 $b \rightarrow c$   
 $c \rightarrow d$   
 $e \rightarrow a$   
 $d \rightarrow e$