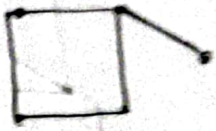
Connected Graph

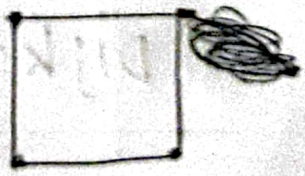
A graph is connected if every pair of vertices (nodes) of the graph are connected by a path (edge)



CG

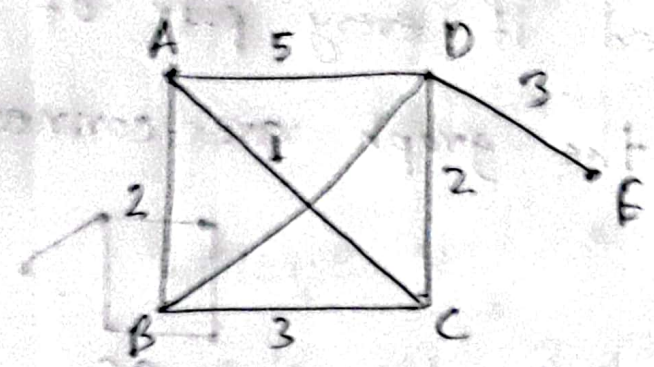
Disconnected Graph

A graph is disconnected if atleast a pair of vertices (nodes) in the graph is not connected by a path (edge)



DG

Single source shortest path (SSSP)



A to D

✗ A D → 5

✓ A C → C D → 3 – (shortest path)

Dijkstra's Algorithm

(1) start node = 0, other nodes = ∞

(2) Visit unvisited node with smallest known distance from starting vertex.

(3) For current vertex, examine it's unvisited neighbours.

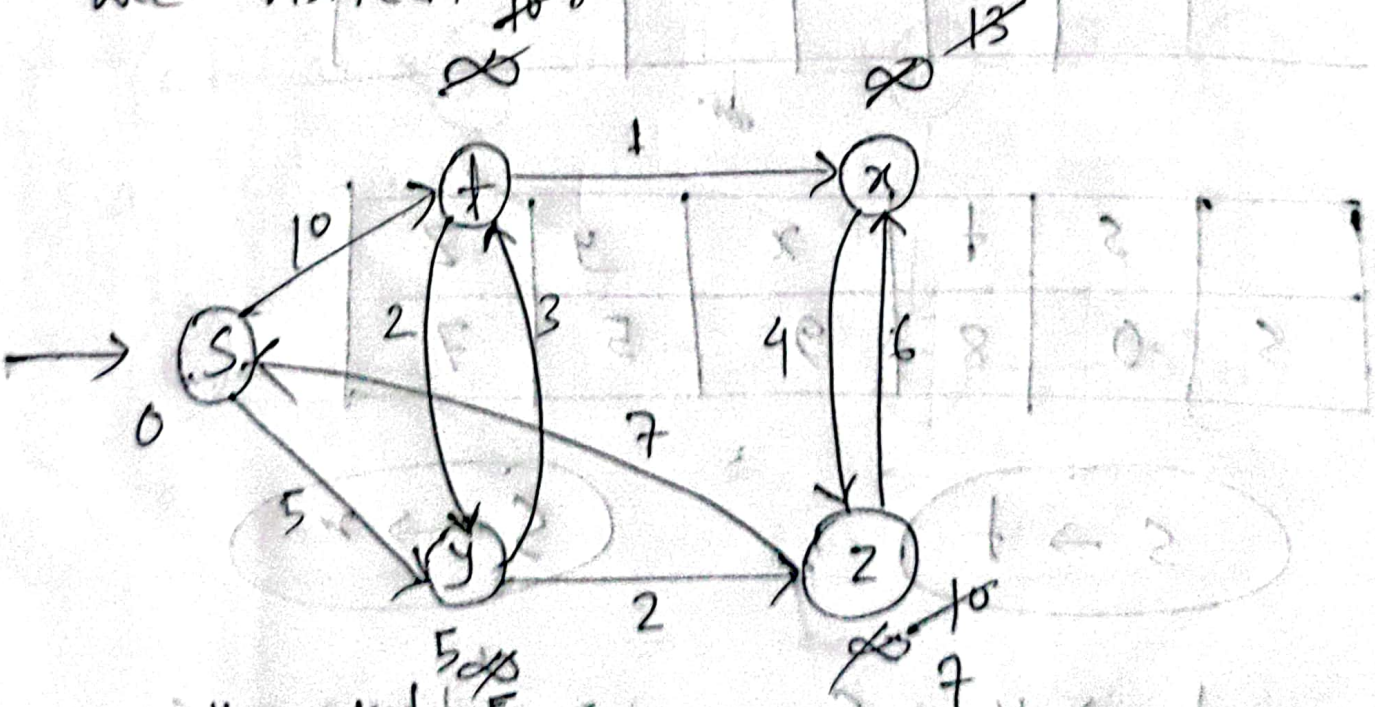
④ Relaxation

if $(d(v) > d(u) + d(w))$

assign $d(v) = d(u) + d(w)$

⑤ Update the previous vertex for each update distance

⑥ Repeat step {②-⑤} until all vertices are visited.



Here, let $d(v) = 2$, $d(u) = y$ and $w = 2$

$\therefore d(v) > d(u) + d(w)$

$10 > 5 + 2$

$10 > 7$ So let assign 7 in place of 10

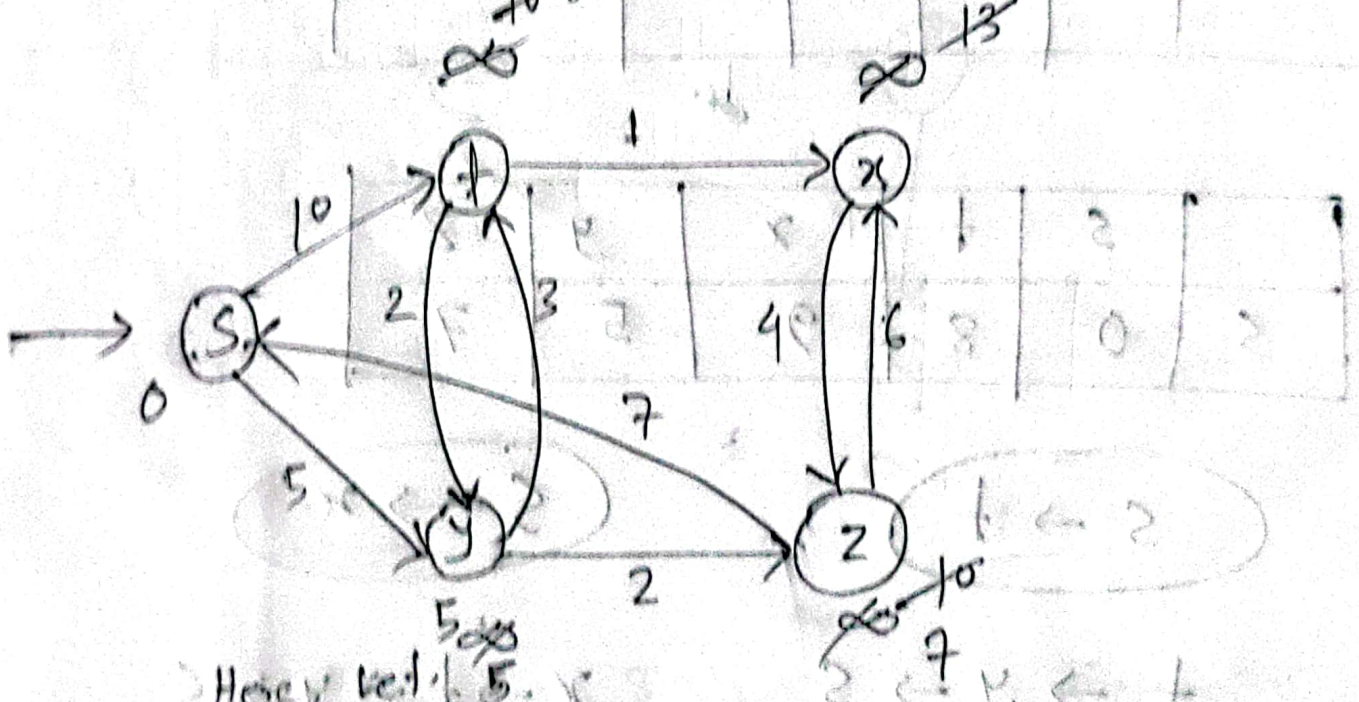
(4) Relaxation

if $(d(v) > d(u) + d(w))$

assign $d(v) = d(u) + d(w)$

(5) Update the previous vertex for each update distance

(6) Repeat step {(2) - (5)} until all vertices are visited.



Here, vertex 5.

$d(v) = z$, $d(u) = y$ and $w = 2$

$d(v) > d(u) + d(w)$

$10 > 5 + 2$

$10 > 7$ So let assign 7 in place of 10

visited	s	t	x	y	z
s	0	∞	∞	∞	∞
y		10	∞	5	∞
z		8	∞		7
t		8	13		
x			9		

	s	t	x	y	z
s	0	8	9	5	7

$s \to t$

$s \to x$

$t \to y \to s$

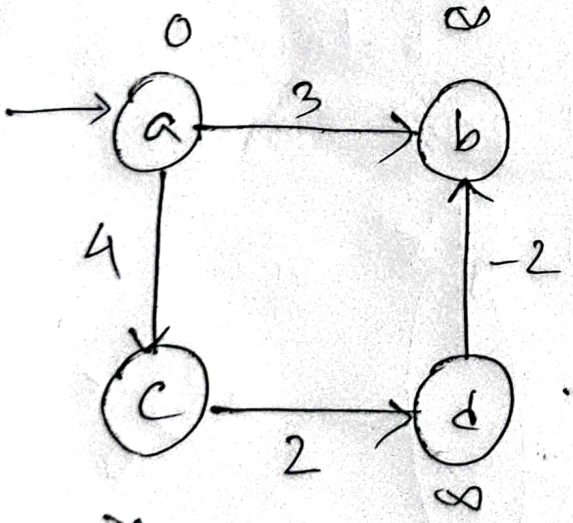
$x \to t \to y \to s$

so $s \to y \to t$

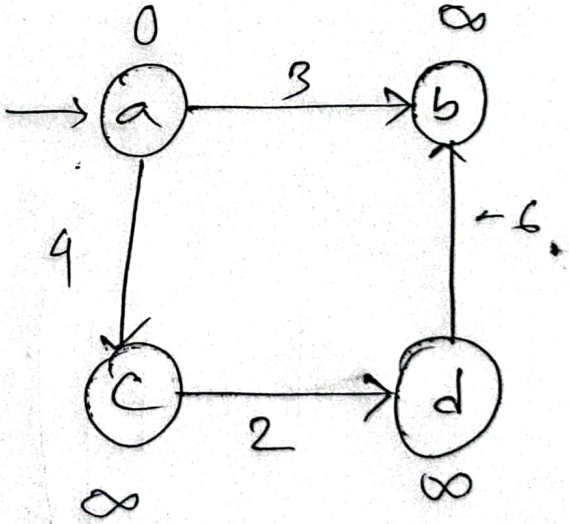
so, $s \to y \to t \to x$

Negative value edge এর ক্ষেত্রে dijkstra কাজ করে না. But Negative cycle value যাকলে কাজ করে Bellman ford Algorithm দিয়ে।

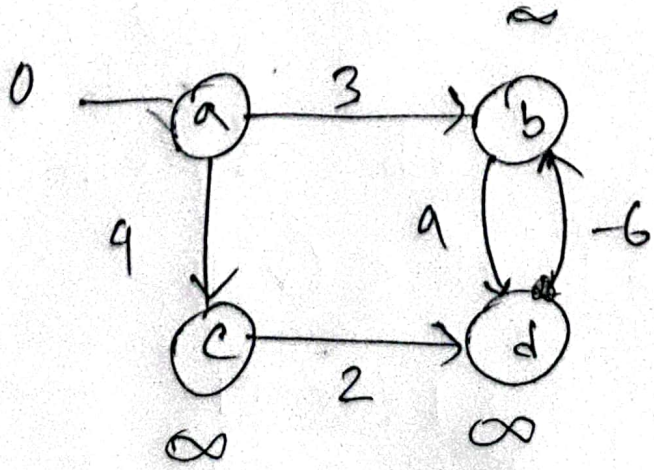
~~Bellman ford~~



Prob-1



Prob 2



(1) Negative weight থাকে নাকি Negative cycle থাকে নাকি?