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# Bellman ford

find  
-ve cycle

-ve cycle  $\rightarrow$  No  
 $\hookrightarrow$  S.P

-ve weight

-ve cycle

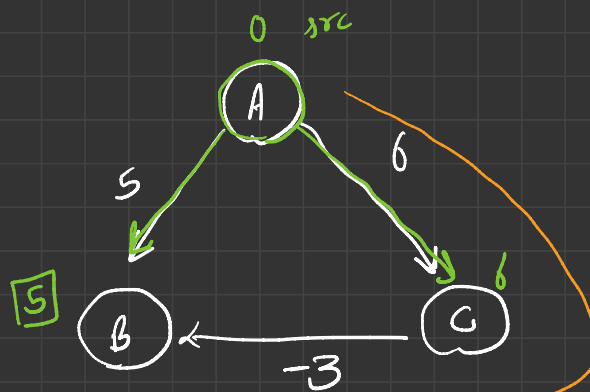
UG

DG

with -ve negi

Dijkstra's Algo

-ve weight

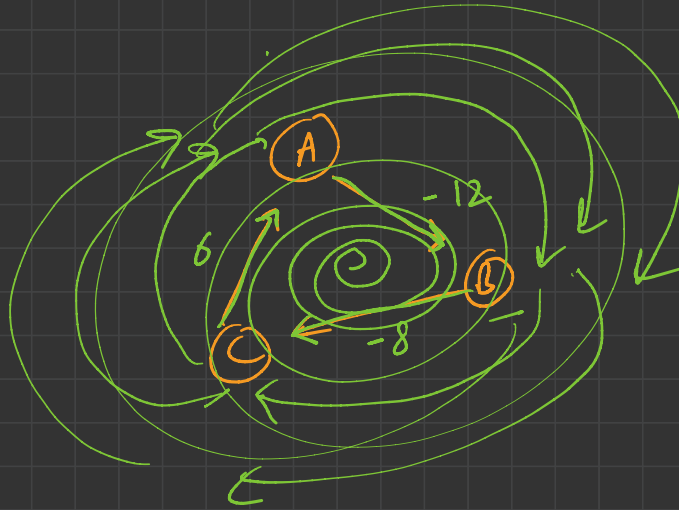


$$A \rightarrow B \rightarrow \boxed{5} \quad \underline{WA}$$

$$A \rightarrow C \rightarrow 6$$

$$A \rightarrow C \rightarrow B \rightarrow 6 + (-7) = \boxed{3}$$

-ve cycle

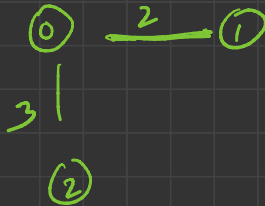


$$6 + (-12) = \boxed{6} - 8 = -14 \neq 0$$

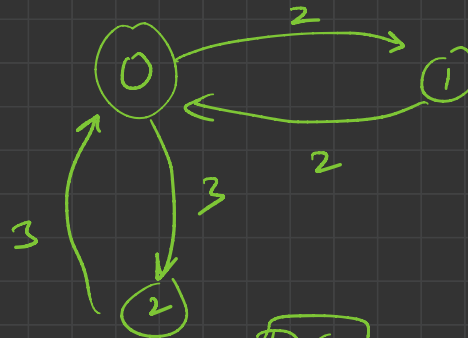
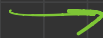
$$= -8 - 12 \\ = \boxed{-20}$$

$$\boxed{-28} = -22$$

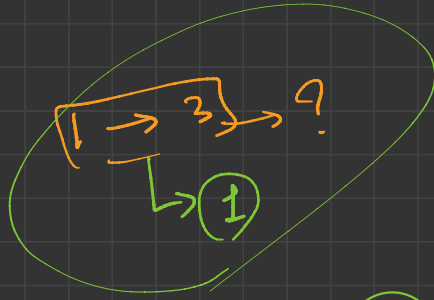
$$\boxed{-31}$$



$\boxed{UG}$



$\boxed{DG}$



B.F

why?

$u \xrightarrow{wt} v$

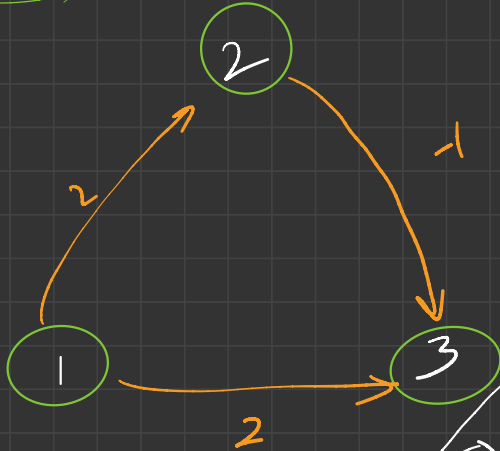
saari edges

$(n-1)$  times

if ( $dist[u] + wt < dist[v]$ )

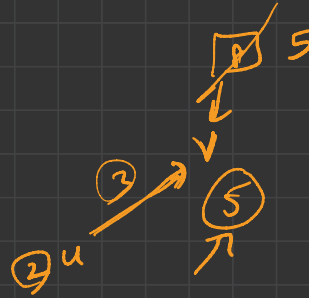
$dist[v] = dist[u] + wt$

logical



$1 \rightarrow 2$  (2)  
 $2 \rightarrow 3$  (1)  
 $1 \rightarrow 3$  (2)

(n-1) times



②

more time →

same formula

yes  
dist → update

no

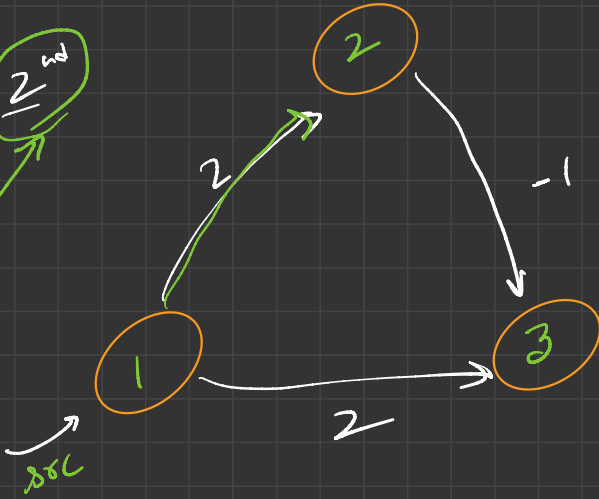
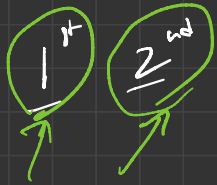
return

dist[dest];

-ve cycle present

SPX

$n=3$



edges)

$u \rightarrow v$  w1  
 $2 \rightarrow 2$  (2)

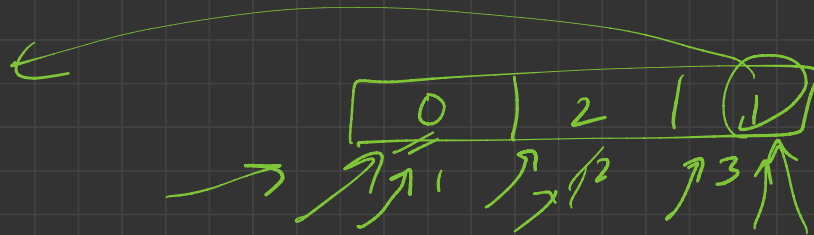
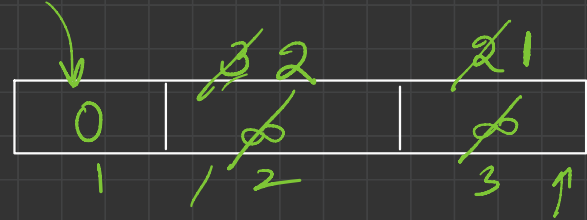
$2 \rightarrow 3$  (-1)

$u \rightarrow v$  w1  
 $1 \rightarrow 3$  (2)

T.C

$(n-1) \times \sum_m$

$O(n \times m)$



check cycle -

-ve cycle  
↓  
not  
possible

$$\text{dist}[2] + (-1) < \text{dist}[3]$$

$$2 + (-1) < 1$$

$$1 < 1$$

→ F

$$\begin{matrix} u & v \\ \hookrightarrow & 1 \rightarrow 2 \end{matrix}$$

$$\begin{matrix} wt \\ (2) \\ \hline \end{matrix}$$

$$\hookrightarrow 2 \rightarrow 3$$

$$(-1)$$

$$\hookrightarrow 1 \rightarrow 3$$

$$\begin{matrix} (2) \\ \uparrow \end{matrix}$$

$$\text{dist}[1] + 2 < \text{dist}[3]$$

$$0 + 2 < 1$$

$$2 < 1$$

→ F

















