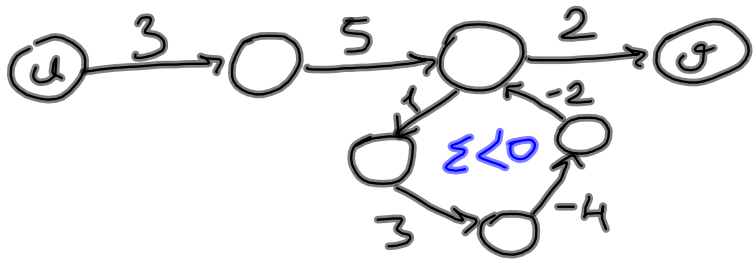
Negatif Ağırlıklı Çevrim



$\delta(u,v) = -\infty$

en kısa yol yok

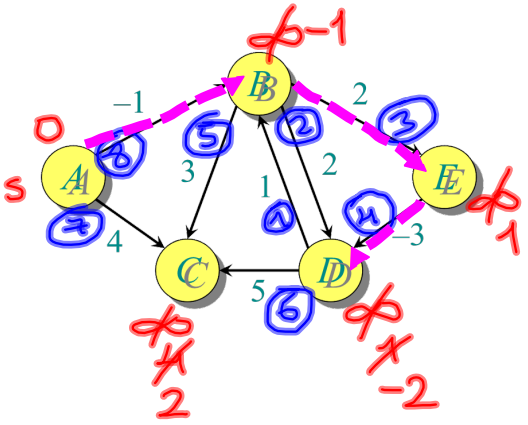
Bellman-Ford Alg.

Bir kaynaktan diğer tüm tepelere en kısa yolları bulur veya grafta negatif ağırlıklı bir çevrim varsa tespit eder.

$d[s] \leftarrow 0$
for each $v \in V - \{s\}$ } initialization
  do $d[v] \leftarrow \infty$

for $i \leftarrow 1$ **to** $|V| - 1$
  do for each edge $(u, v) \in E$
    do if $d[v] > d[u] + w(u, v)$ } ***relaxation step***
      then $d[v] \leftarrow d[u] + w(u, v)$

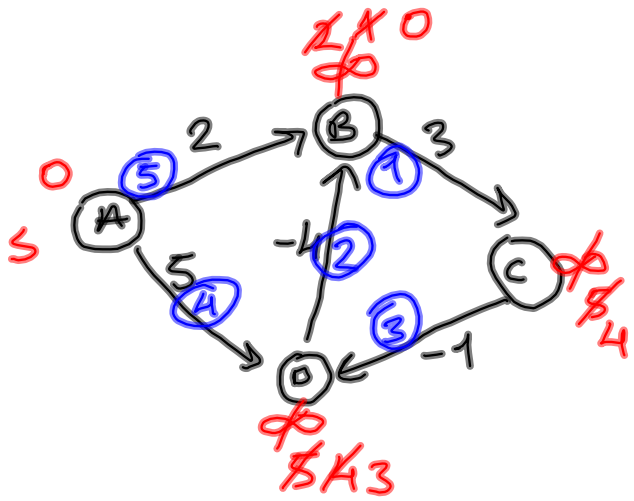
for each edge $(u, v) \in E$
  do if $d[v] > d[u] + w(u, v)$
    then "report that a negative weight cycle exists."



	A	B	C	D	E
round1:	0	-1	4	∞	∞
round2:	0	-1	2	-2	1
round3:	0	-1	2	-2	1
round4:	Aynı				

extra round: if koşulu sağlanmadı

Örnek:



	A	B	C	D
round 1:	0	2	∞	5
round 2:	0	1	5	4
round 3:	0	0	4	3

extra round: grafta negatif ağırlıklı çevrim var

Çalışma Zamanı Analizi

$\Theta(1)$ $d[s] \leftarrow 0$
$\Theta(V)$ **for** each $v \in V - \{s\}$ } initialization
do $d[v] \leftarrow \infty$

$\Theta(V)$ **for** $i \leftarrow 1$ **to** $|V| - 1$
$\Theta(E)$ **do for** each edge $(u, v) \in E$
do if $d[v] > d[u] + w(u, v)$ } ***relaxation step***
then $d[v] \leftarrow d[u] + w(u, v)$

$O(E)$ **for** each edge $(u, v) \in E$
do if $d[v] > d[u] + w(u, v)$
then " report ... " and exit

$T(E, V) = \Theta(E \cdot V)$

Q3. (a) What is the output of the following function for the call New(5,1). **[8P]**

```
function New(n,acc)
  if n == 1
     return 1*acc;
  return New(n-1,acc*n);
```

New(5,1)
↓
New(4,5)
↓
New(3,20)
↓
New(2,60)
↓
New(1,120)
↓
return 120

New(n,m)
↓
return n!·m

New(n,1) = n!

$T(n) = T(n-1) + \Theta(1)$
$= \Theta(n)$

(b) Convert the recursive function to an iterative function. **[10P]**

```
New_iter(n,acc)
  result=1
  for i=n to 1
     result= result*n
  return result*acc
```

$T(n) = \Theta(n)$

```
int New_iter(n,acc){
  int i;
  for(i=n;i>0;i--){
    acc *=i;
  }
  return acc;
}
```