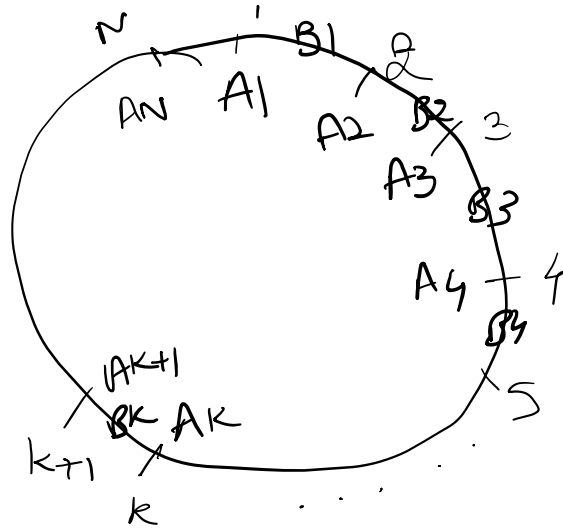


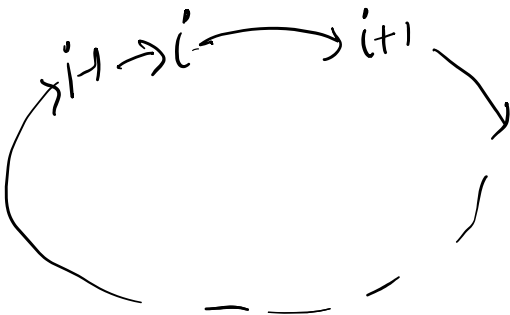
# Google interview questions

## Q1) optimal\_starting\_point\_circuits

N Gas stations are present on a circuit. A car needs to take a round on circuit. Initial fuel at car is 0. At station i gas filled is  $A_i$  and the gas consumption from i to i+1 is  $B_i$ . If the fuel  $\leq 0$  before reaching a gas station, the car will halt. Find the optimal starting point in the circuit for car to finish the circuit and the optimal solution is also most lowest gas consumption. (clockwise movement in circuit).



let us assume, the journey starts at  $i^{th}$  node.  
 $\Rightarrow$  journey starting at  $i^{th}$  node is most optimal

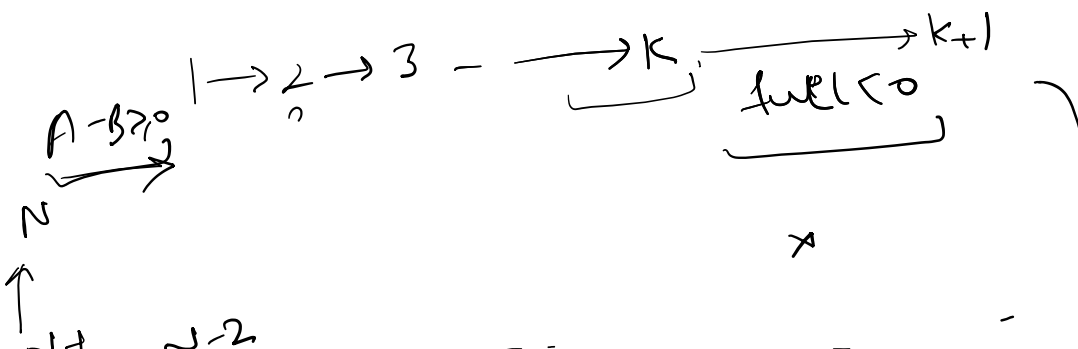


$$\sum A_i - \sum B_i \leq 0$$

$\Downarrow$

Journey is possible

But we have to find the solution where fuel  $> 0$



# Algorithm

always doing  
jumping.  
and fuel  $\geq 0$  for  
reaching

→ Start at Node 1

keep Adding  $(A_i - B_i) \forall i \rightarrow 1, k$   $\Rightarrow$  fuel  $= A_i - B_i$

where fuel  $\geq 0$

when for some  $k$ , fuel  $< 0$

Now add  $j^{\text{th}}$  node where  $j \in N, N+1, \dots, i$

if  $A - B \geq 0$

↓

Move after  $k$   
& keep moving until  
we get fuel  $< 0$   
& repeat

if  $A - B < 0$

↓  
 $N+1$

repeat  
until  
 $j = i$

if fuel  $\geq 0$  &  $j = i+1$

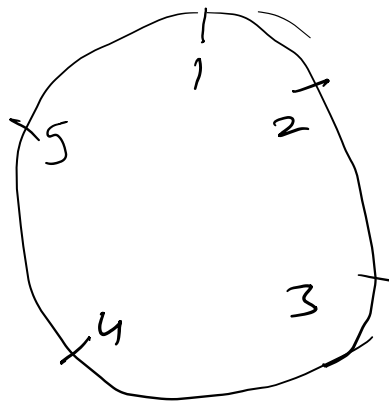
$\Rightarrow$  it's the starting point  
else

Complexity =  $\theta(n)$

return -1

$\begin{matrix} 0 & 1 & 2 \\ \downarrow & \downarrow & \downarrow \\ 0 & 1 & 2 \end{matrix} \rightarrow$

Example :-



$i$	A	B
1	10	11
2	12	12
3	13	13
4	14	14
5	15	12

$\text{while}(i \leq j)$   
 $\{ \text{fuel} = 0$

$i = 0$

$$\text{fuel} = 10 - 11 = -1 \quad i = \text{X}$$

$$j = N-1 \quad \text{fuel} = -1 + 15 - 12 = 2 \quad j = \text{X}$$

$$i = 1 \quad \text{fuel} = 2 + 12 - 12 = 2$$

$$i = 2 \quad \text{fuel} = 13 - 13 + 2 = 2$$

$$i = 3 \quad \text{fuel} = 14 - 14 + 2 = 2$$

$y \rightarrow i > j$   $\rightarrow$  if  $\text{fuel} \geq 0$   $\Rightarrow$  return -1

$\Downarrow$   
 returns success  
 $(i) \bmod N$