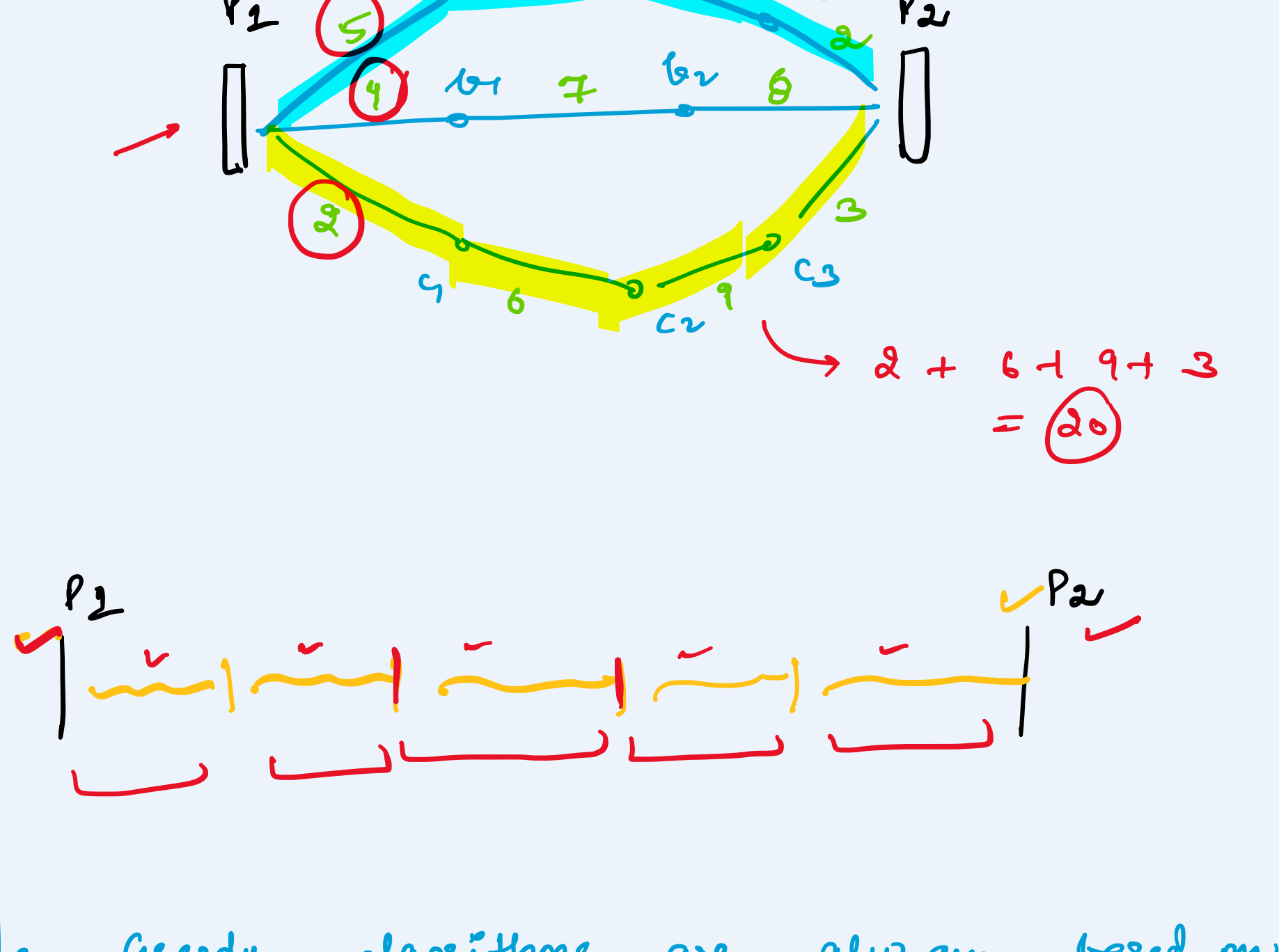


# Greedy Algorithms

Greedy Algorithms always make the choice that seems to be best at the moment without taking into consideration the future consequences



1. Greedy algorithms are always based on intuition & observation.

2. Greedy algorithms can only work when local optimal solution contributes to global answer.

Two properties:

① Greedy choice property:

If by choosing the best choice at each step without reconsidering the previous step once chosen.

② optimal substructure

If the optimal overall solution to the problem corresponds to the optimal solution to its subproblems.

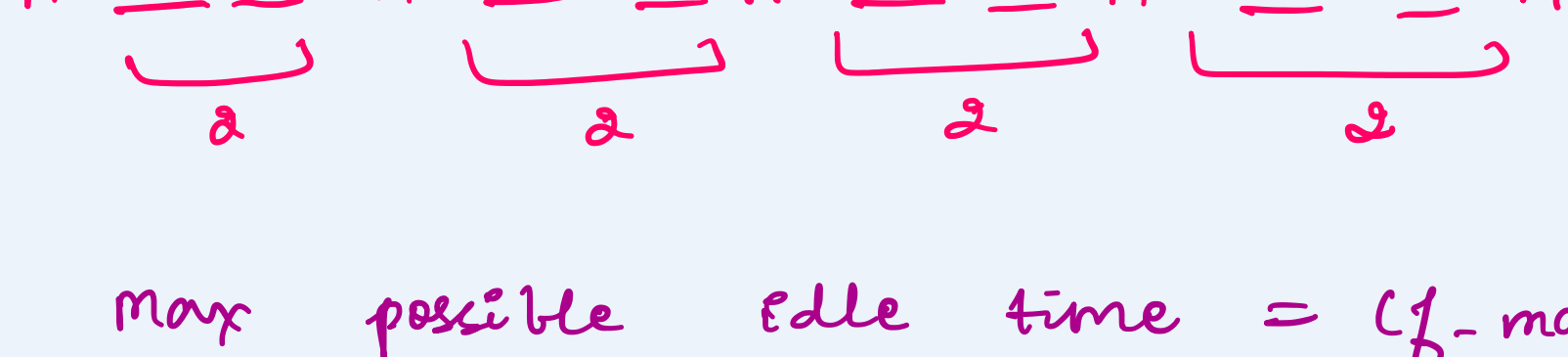
Q Task scheduler (Leetcode)

Total CPU cycles = Busy + Idle ??

No. of busy slots = no. of tasks execute = len(ans)

Max no. of idle slots is defined by the frequency of most frequent task.

A B A A B C A A n=2



max possible idle time = (f-max-1) \* cooling period

$$= (5-1) * 2 = 8$$

① A B A A B C A A  
 → A → 5  
 → B → 2  
 → C → 1

Total time = 8 + 5 = 13

A → 6  
 → B → 6  
 → C → 5 n=1

A B A B A B A B A B C C C C C

Q Given an array of +ve & -ve integers, find the min possible subset product.

Eg: [-1, -1, -2, 4, 3] ans = -24

Eg: [-1, 0] ans = -1

Eg: [-1, 0, 2] ans = -2

① what if all +ve no ?? [no negative no]

[2 1 3 5]

[2 1 3 0 4 5]

ans → min ele of array

② what if 1 -ve no is present? [odd no. of negative no]

[2 1 3 0 4 5 -1]

ans = -1

all other no. except 0

③ what if 2 -ve no are present? [even no. negative no]

[2 1 3 3 4 5] [-2] -1

ans = -2

-ve with smaller magnitude

all positive no except 0

Defining factor → no. of negative elements.

Cases:

1. no negative no → min (arr)

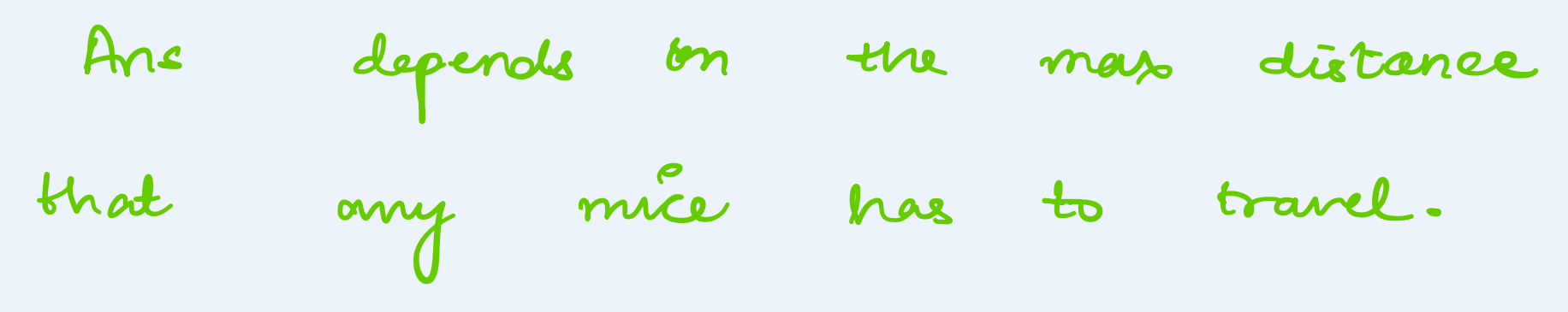
2. even no. of negative no  
 →  $\prod [a[i]] \times \text{negative no. of } a[i] \neq 0$  min value

3. odd no. of negative no  
 $\prod [a[i]]$   
 $a[i] \neq 0$

Q Mice & holes

mice = [4, -4, 2]

holes = [4, 0, 5]



Ans depends on the max distance that any mice has to travel.

① sort the mice positions

② sort the holes positions.

$$|mice[i] - hole[i]|$$

mice → [-4, 2, 4]  
 holes → [0, 4, 5]

4 2 1

$$i=0 \Rightarrow |-4-0| = 4$$

$$i=1 \Rightarrow |2-4| = 2$$

$$i=2 \Rightarrow |4-5| = 1$$

$$\max(4, 2, 1) = 4 \text{ ans}$$