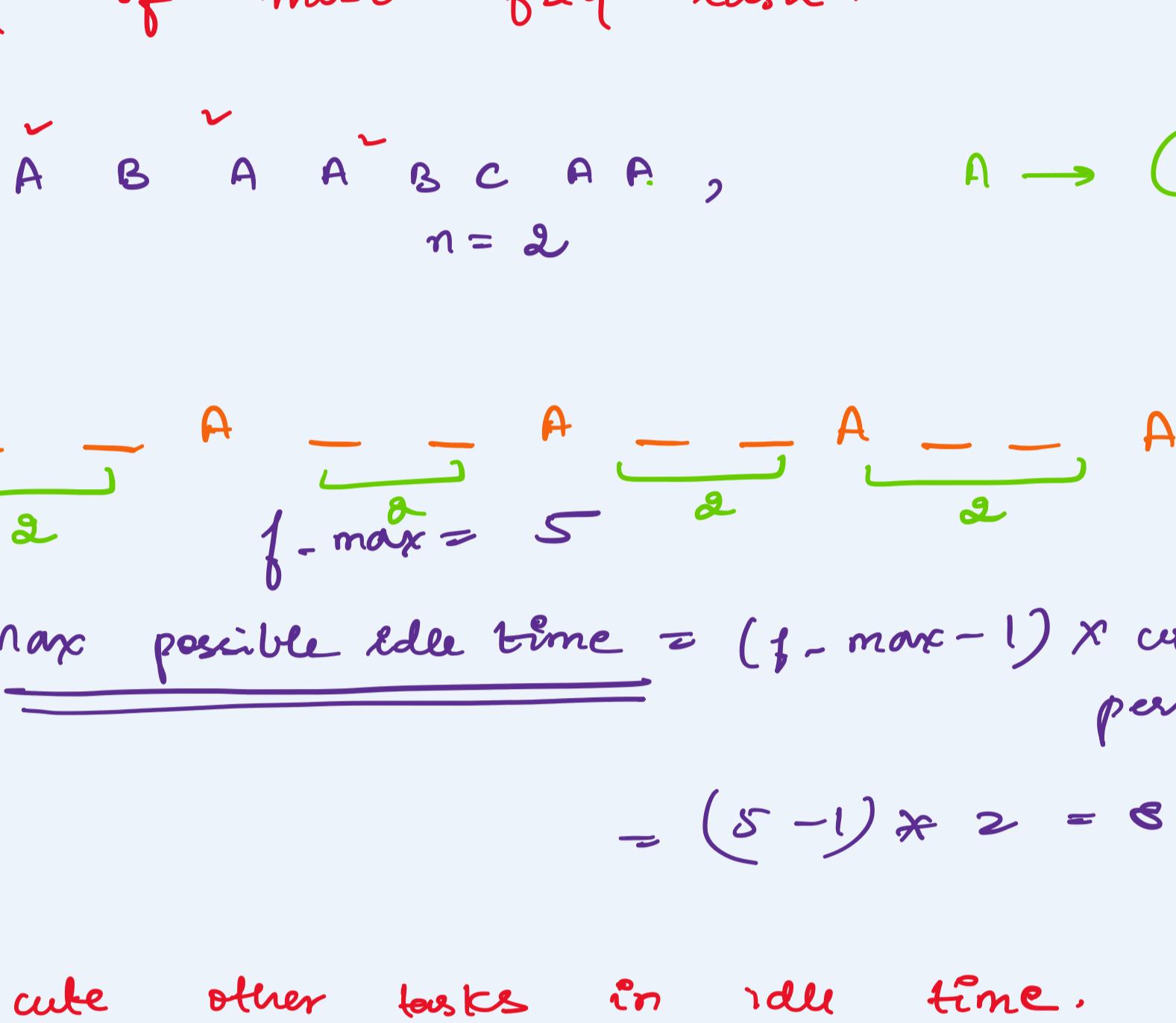
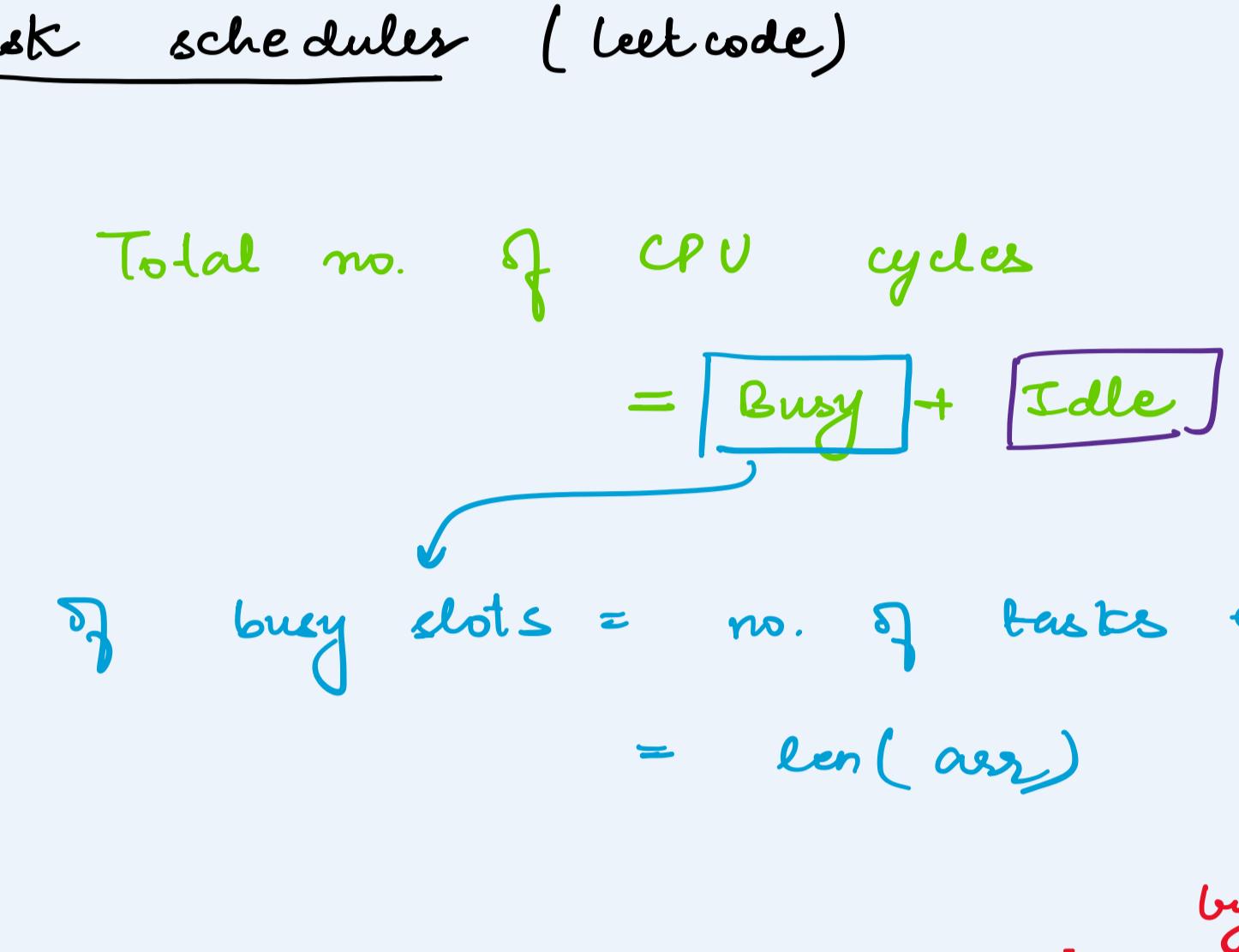
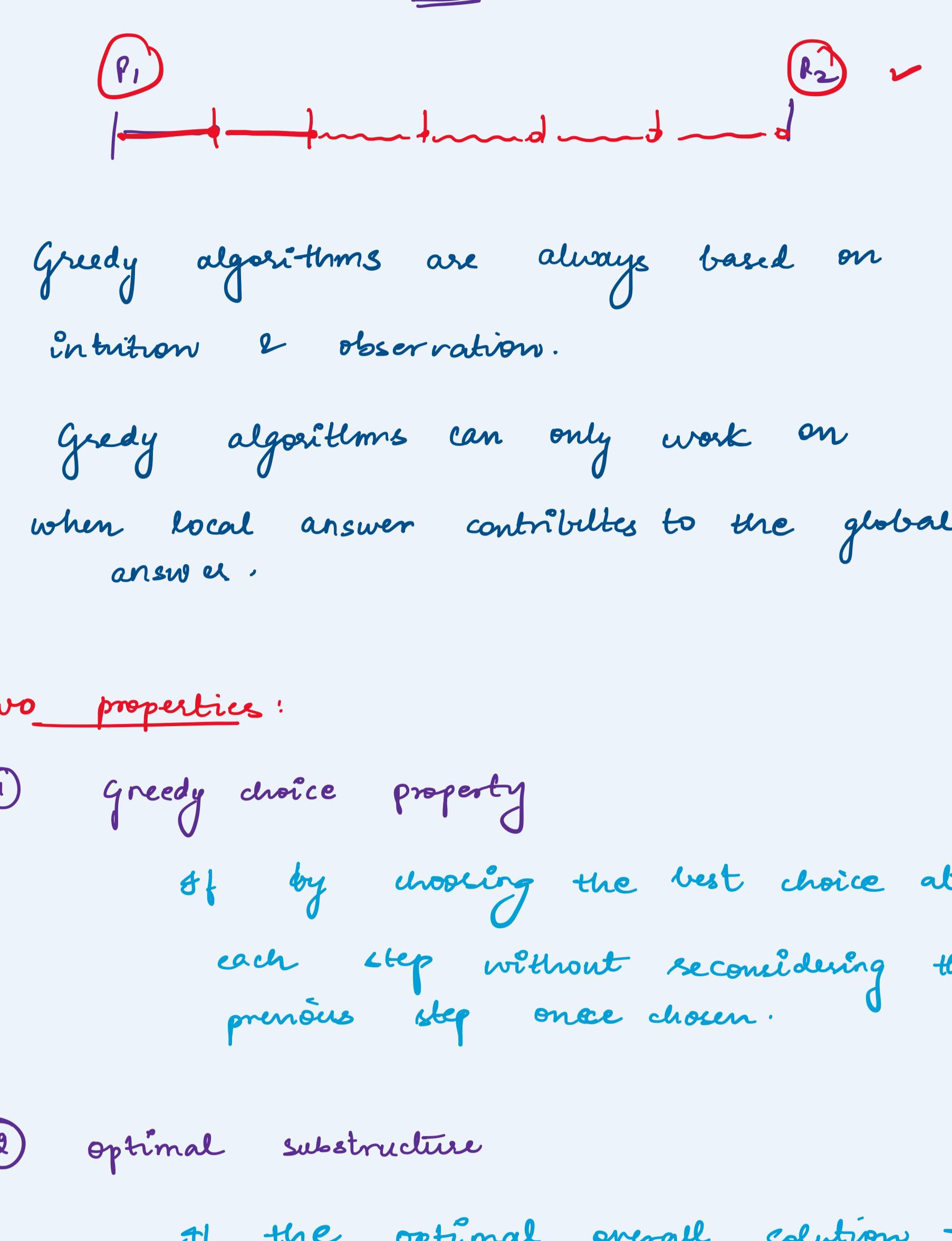


Greedy Algorithms

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 on when local answer contributes to the 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 schedules (leetcode)

Ans Total no. of CPU cycles
 $= \boxed{\text{Busy}} + \boxed{\text{Idle}} \rightarrow ??$

No. of busy slots = no. of tasks execute
 $= \text{len}(\text{arr})$

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

A B A A B C A A , A → ⑤
 $n = 2$

A — A — A — A — A — A — A — A
 $\downarrow \quad \downarrow \quad \downarrow \quad \downarrow \quad \downarrow \quad \downarrow \quad \downarrow \quad \downarrow$
 $f_{\max} = 5$

Max possible idle time = $(f_{\max} - 1) \times \text{cooling period}$

$= (5 - 1) \times 2 = 8$

Execute other tasks in idle time.

→ A B A A B C A A

① Freq(A → 5, B → 2, C → 1)

→ B → ②

→ C → ① →

⑧ → ③ → ④

A B C A B — A — A — A — A

Total time → 8 + 5 → 13

Q Given an array of the 8 -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

what if all the no. are +ve? [no negative no.]
 $[2 \ 1 \ 3 \ 5]$

$[2 \ 1 \ 3 \ 0 \ 4 \ 5]$

ans → min ele of the array.

what if 1 -ve no. is present??

$[2 \ 1 \ 3 \ 0 \ 4 \ 5 \ -1]$

ans = $-1 \times \underbrace{\text{all other no.}}_{\text{except } 0}$

what if 2 -ve no. are present??

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

→ ans = $\underbrace{-2}_{-\text{ve with smaller magnitude}} \times \underbrace{-1}_{\text{all +ve except } 0}$

Defining factor → no. of negative elements.

Cases:

- ① no negative no. → $\min(\text{arr})$
- ② even no. of negative no.
 $\rightarrow \prod [a[i]] \times \underbrace{\text{negative no. of min value}}_{\text{min value}}$
 $\rightarrow \prod [a[i] + 0]$

Q Mice and 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 hole positions.

$[\text{mice}[i] - \text{hole}[i]]$

mice → $[-4, 2, 4]$

holes → $[4, 0, 5]$

$\downarrow \quad \downarrow \quad \downarrow$

④ ② ①

$i = 0 = | -4 - 4 | = 4$

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

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

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

Q Meeting rooms II (leetcode)

intervals: $[0, 30], [5, 10], [15, 20]$

ans → ②

$0 \quad 5 \quad 10 \quad 15 \quad 20$

ans → ②

$0 \quad 5 \quad 10 \quad 15 \quad 20$

ans → ②

$(1, 10), (2, 7), (3, 19), (8, 12), (10, 20), (11, 30)$

$\downarrow \quad \downarrow \quad \downarrow \quad \downarrow \quad \downarrow \quad \downarrow$

1 start time

2 start time

3 start time

4 start time

5 start time

6 start time

7 start time

8 start time

9 start time

10 start time

11 start time

12 start time

13 start time

14 start time

15 start time

16 start time

17 start time

18 start time

19 start time

20 start time

21 start time

22 start time

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