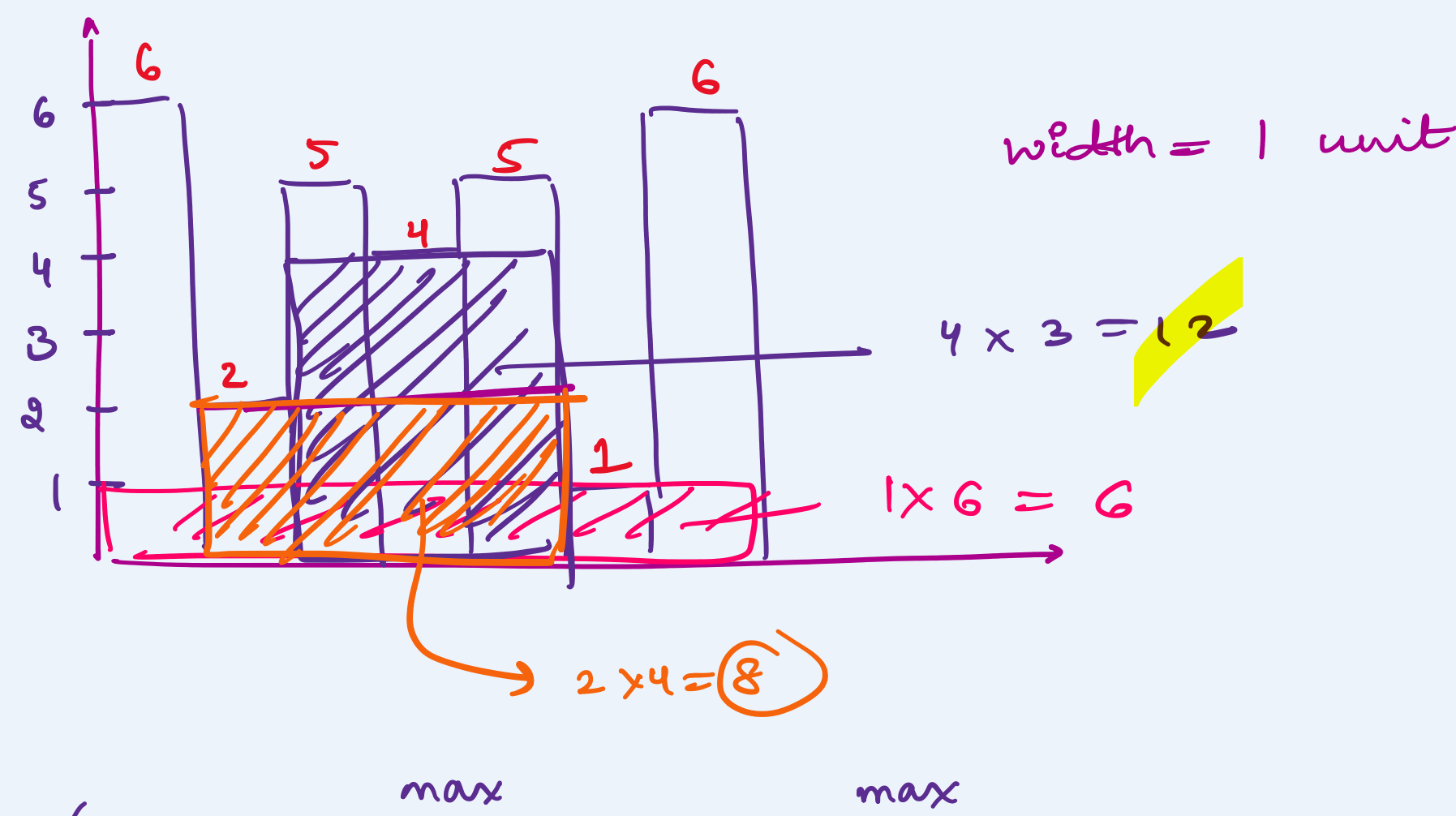
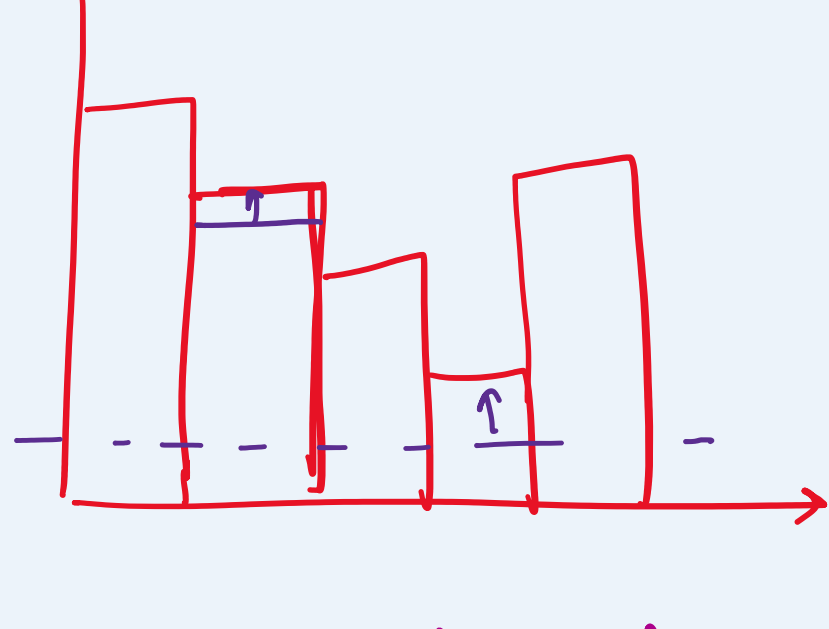


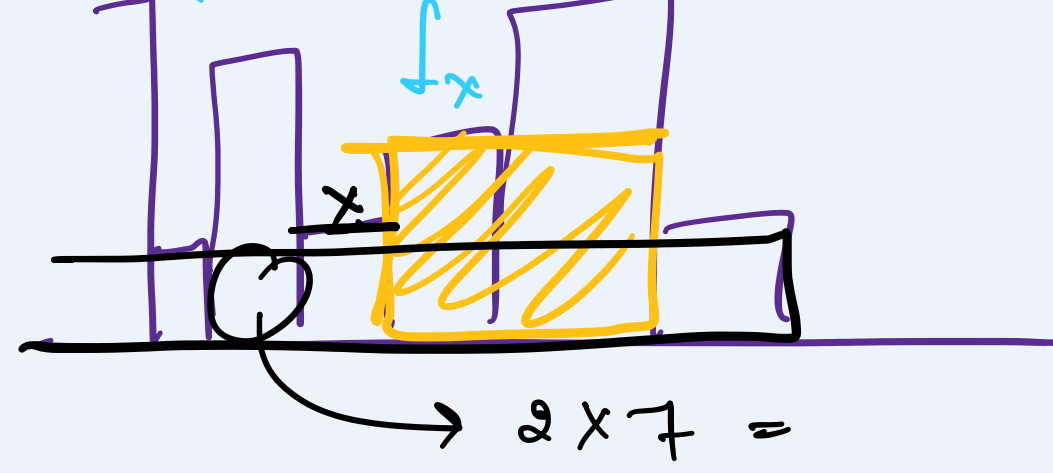
Q Largest rectangle in histogram



$$\max(\text{Area}) = \left(\max(\text{height}) \right) \times \left(\max(\text{width}) \right)$$



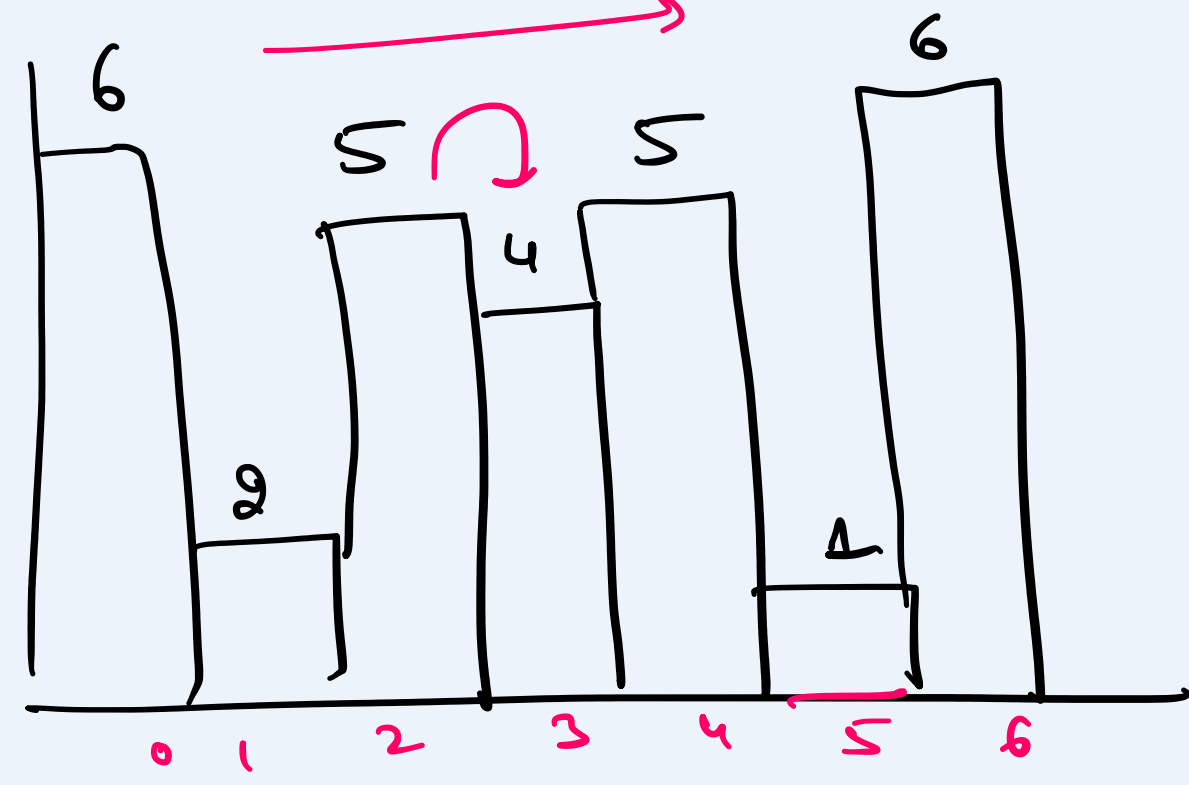
Height will always be atleast one of the bars of histogram.



We can include all bars of height \geq curr. length.

Brute force $\rightarrow O(n^2)$.

* For every bar of i I can find the index of the height less than curr height on left as well right.



next smaller \rightarrow 1 5 3 5 5 7 7

prev smaller \rightarrow -1 -1 1 1 3 -1 5

$$\frac{\text{curr. bar height}}{\text{height}} \times \frac{(\text{next} - \text{prev} - 1)}{\text{width}}$$

$$1 \Rightarrow 6 \times (1 - (-1) - 1) = 6 \times 1 = 6$$

$$2 \Rightarrow 2 \times (5 + 1 - 1) = 2 \times 5 = 10$$

$$3 \Rightarrow 5 \times (3 - 1 - 1) = 5 \times 1 = 5$$

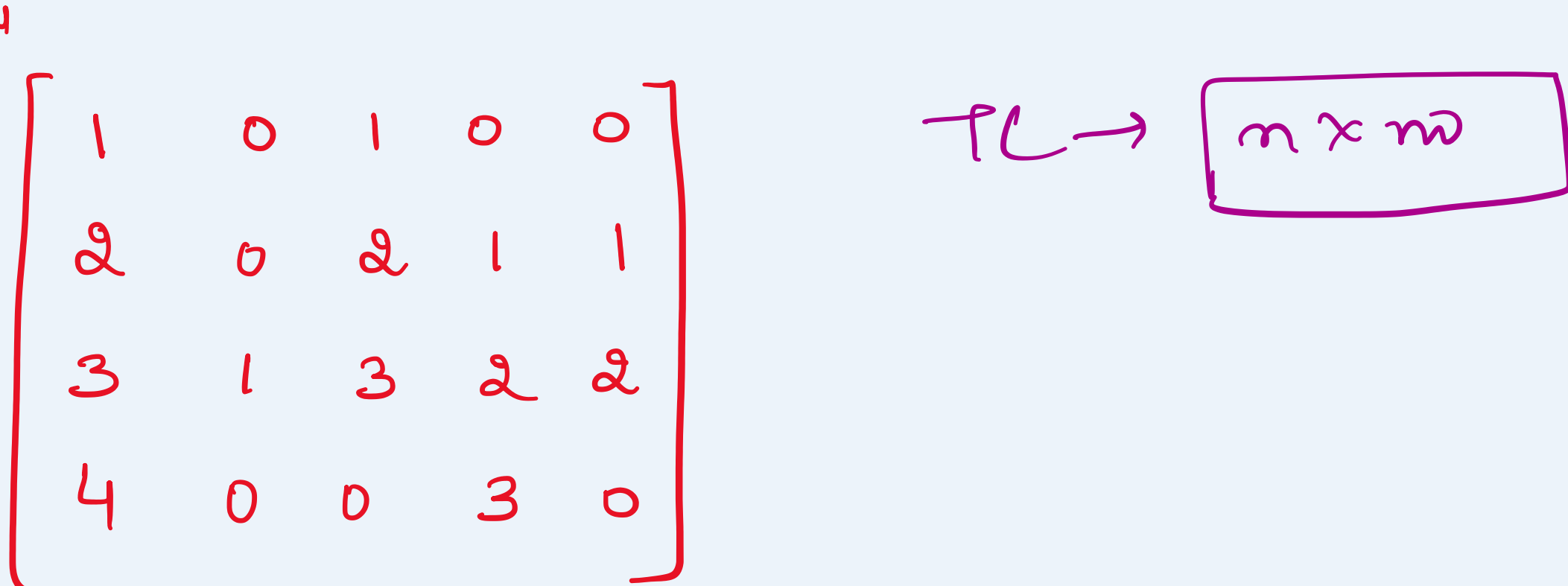
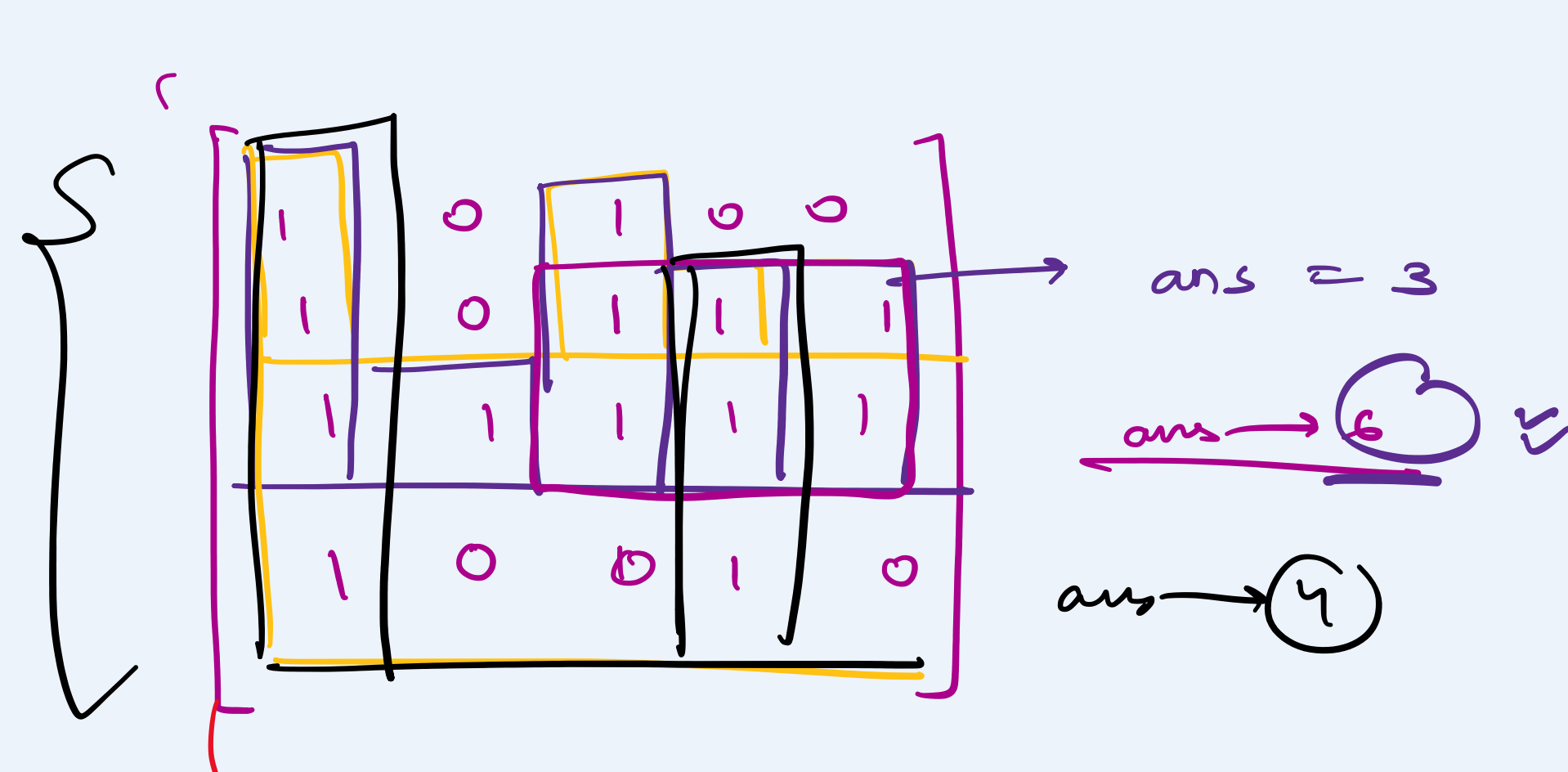
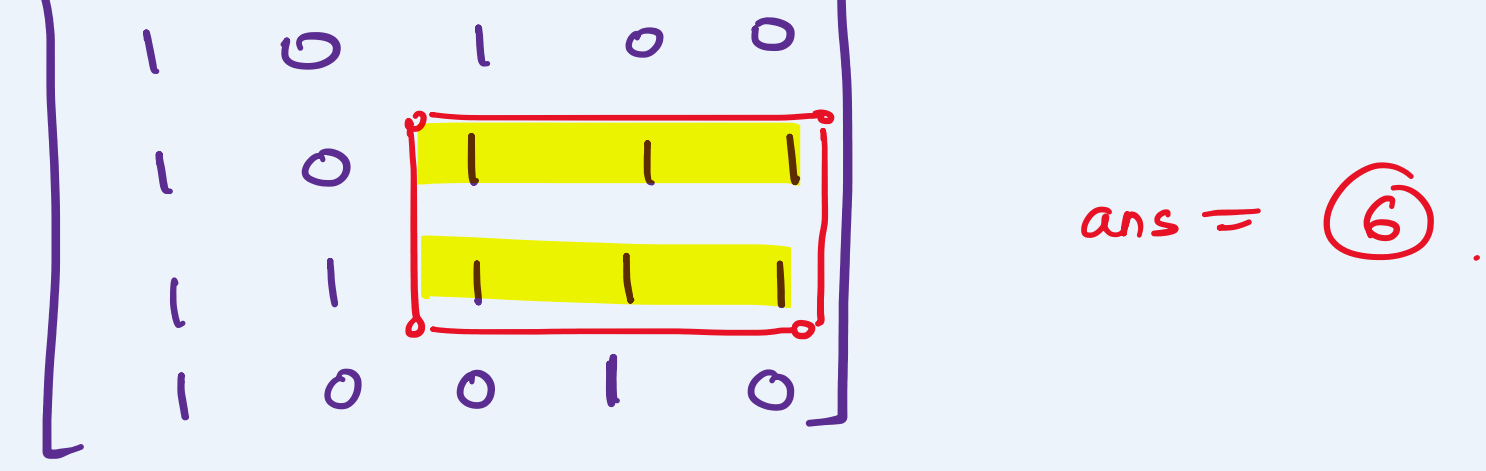
$$4 \Rightarrow 4 \times (5 - 1 - 1) = 4 \times 3 = 12$$

$$5 \Rightarrow 5 \times (5 - 3 - 1) = 5 \times 1 = 5$$

$$6 \Rightarrow 1 \times (7 - (-1) - 1) = 7 \times 1 = 7$$

$$7 \Rightarrow 6 \times (7 - 5 - 1) = 6 \times 1 = 6$$

Q Maximal Rectangle



Q Given a string in encrypted format, find the k^{th} char of decrypted string.

Eg: ab2c3 $k=8$

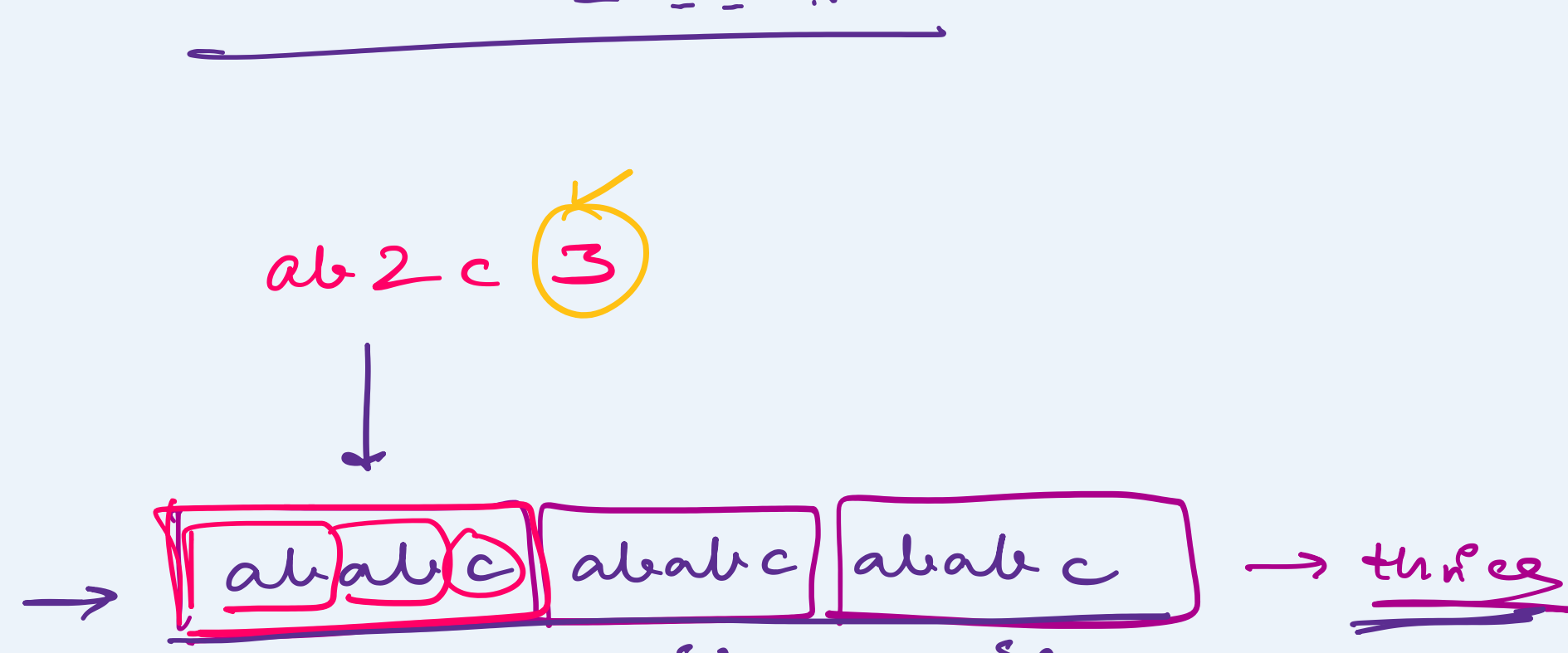
de \rightarrow abab-c abab-c abab-c

ans \rightarrow a

ab2c321

ab ab - - - - c 321 x times

ab2c3



ab ab c

s2 s2 s3

There is a string, there is a substring of length 3, repeated thrice (3) times.

can I say that instead of finding k^{th} char, find $k\%5$ char.

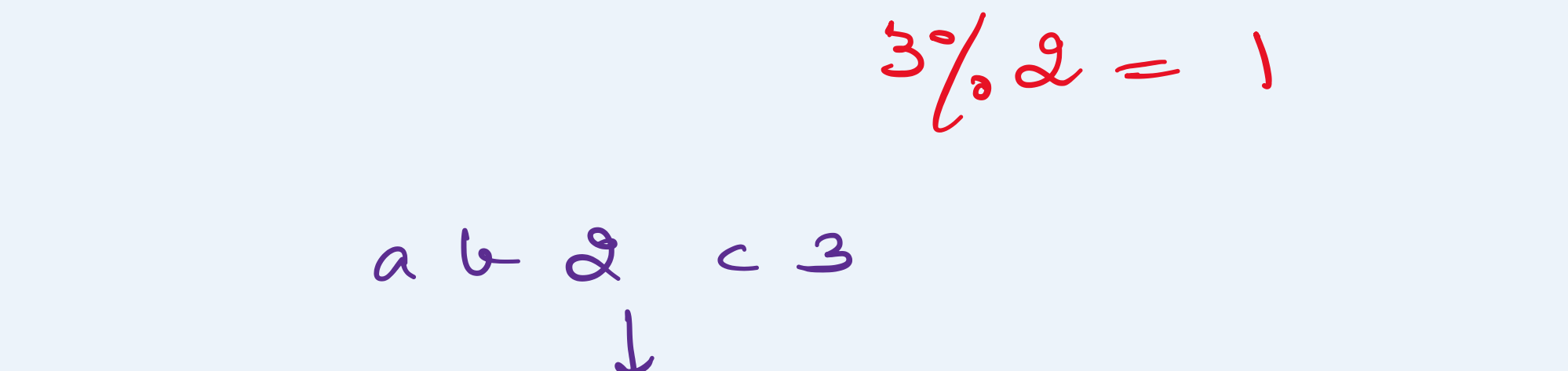


$$\underline{k\%5} = 8\%5 = 3$$

$$3\%2 = 1$$

a b c 3

$$\left((1+1) \times 2 + 1 \right) \times 3$$



ans \rightarrow a

$$3\%2 = 1$$