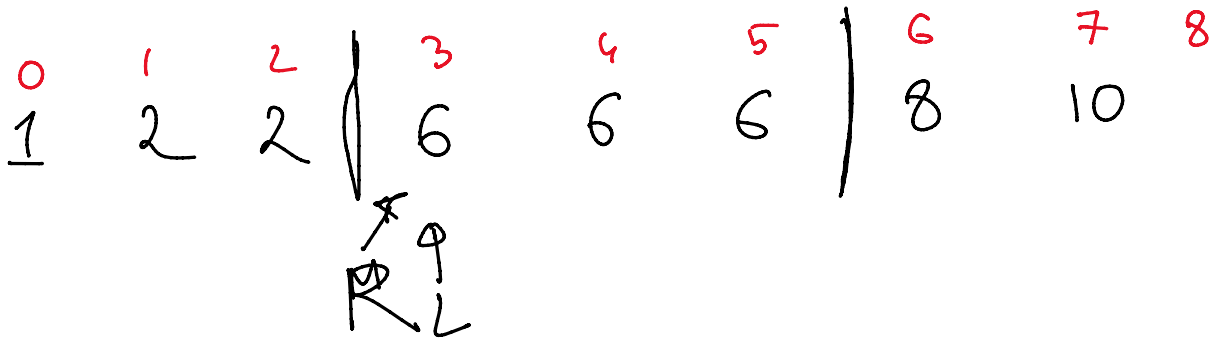


Lower bound / Upper bound



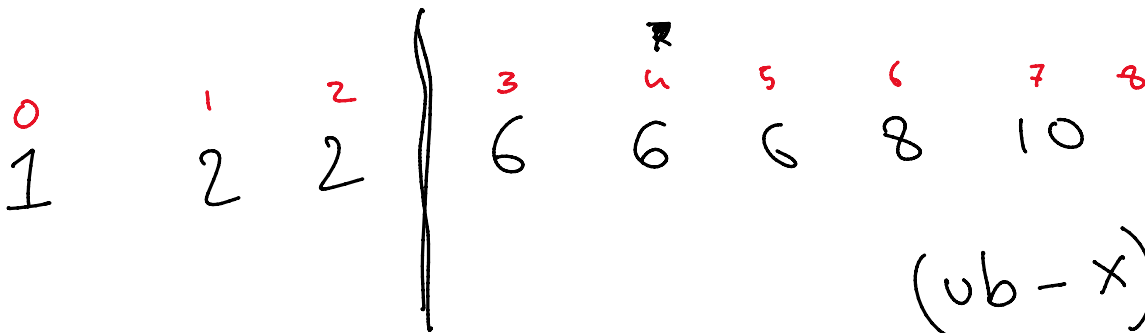
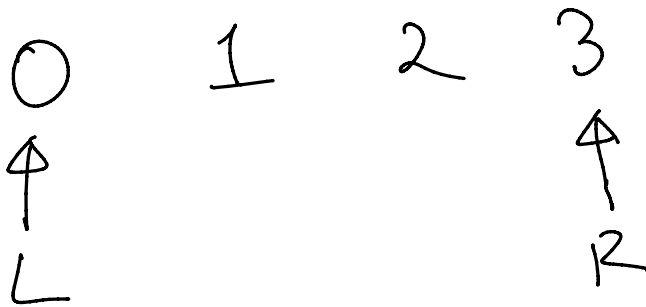
① $arr[M] < v$:
 $L = M + 1$

$M = \frac{L+R}{2}$ $v = 7$
LB

$M = \frac{L+R+1}{2}$

② else :
 $R = M$

$\frac{0+3}{2} = 1.5$



$v = 7$

$arr[M] \leq v$:
 $L = M + 1$

$arr[M] > v$:

$(ub - x) - (lb - x)$
 $= ub - x - lb + x$
 $= ub - lb$

$$1 \leq bv \leq 10^{18} \quad \text{ann}[M] > v: \\ \text{so } R = M$$

$$bv = \frac{1+10}{2}$$

$$\text{Git hub } Q \leq 60$$

✓	✓	✓	×	×	×	×	×	×	×	×	×	×
0	0	0	1	1	1	1	1	1	1	1	1	1

\swarrow
 $\begin{matrix} 4 \\ 3 \end{matrix}$

$$ub(v) = lb(v+1)$$

$$ub(v-1) = lb(v) \quad ub(0) = lb(1)$$

$$ub(4) = lb(5)$$

$$N! \rightarrow \left\lfloor \frac{N}{p} \right\rfloor + \left\lfloor \frac{N}{p^2} \right\rfloor + \left\lfloor \frac{N}{p^3} \right\rfloor + \dots + 0$$

p

$\lfloor \rfloor \rightarrow \text{floor}$

$$N! = 10!$$

$$p = 5$$

$$\left\lfloor \frac{10}{5} \right\rfloor + \left\lfloor \frac{10}{5^2} \right\rfloor$$

$$= 2 +$$

$$\frac{10}{3} + \frac{10}{9} = 3 + 1$$

1 - 0

$$= 2 +$$

$$\frac{1}{3} + \frac{1}{9} = \frac{4}{9}$$

$$10! = 2^8 \times 3^4 \times 5^2 \times 7^1$$

$$\frac{10}{7} = 1 \frac{3}{7}$$

1211 2!

$$136 + 1 = 137$$

10 x 10
(2.5) (2.5) 00

10! = 3 6 2 8 8 0 0

= 3 6 2 8 8 x 10 (2)

R

2 x 2

137

89

10!

10

$$\frac{10^{24}}{24}$$

$$(2 \times 5)^{24}$$
$$2^{24} \times 5^{24}$$

$$10! = 3 6 2 8 8 \boxed{00}$$

=

←

100

(2^2 x 5^2)

$$10! \rightarrow 5$$

10

5

2

2

2

2

2

2

5

5

5

5

12112

↑

↓

$$\frac{12112}{5} + \frac{12112}{5^2}$$

$$3024 = 2422 + 484 + 96 + 19 + 3$$

ans + C

$N! \rightarrow$

$\leftarrow 2$