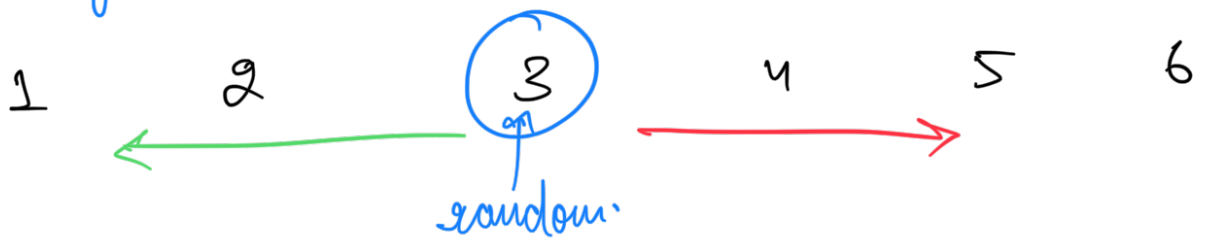


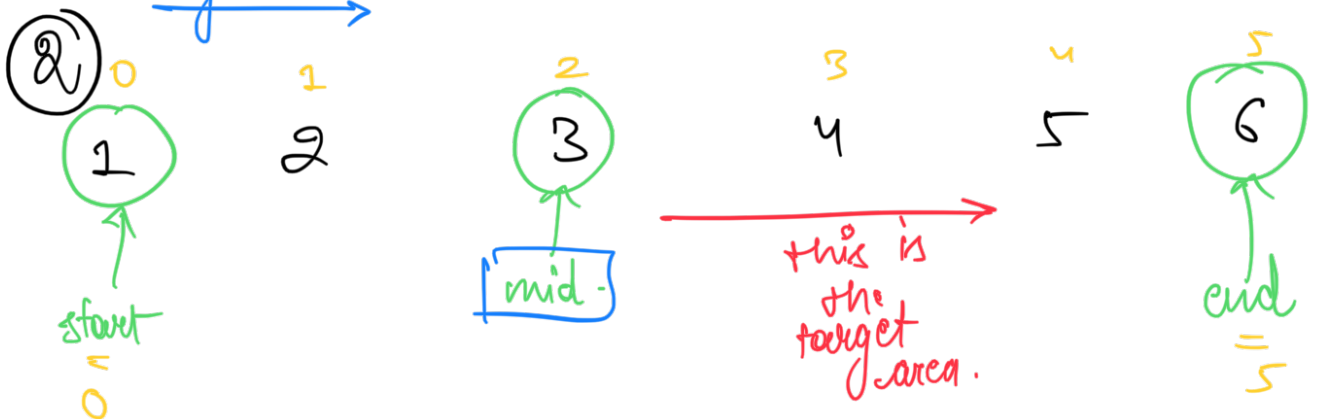
① target = 4 →



→ random > target

└─ true (green arrow)
└─ false (red arrow)

target = 5 →



$$\begin{aligned}
 \text{mid} &= (\text{start} + \text{end}) // 2 \\
 &= (0 + 5) // 2 \\
 &= 2
 \end{aligned}$$

① $\rightarrow a[\text{mid}] == \text{target}$
false.

② $\rightarrow a[\text{mid}] > \text{target}$
false.

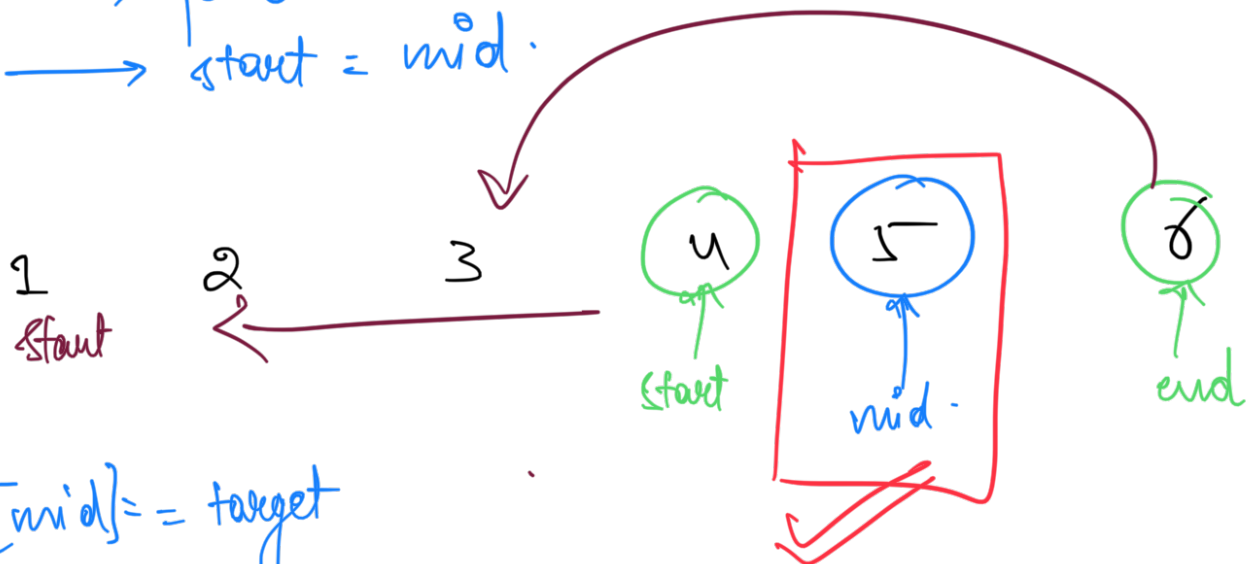
③ $\rightarrow \text{start} = \text{mid}.$



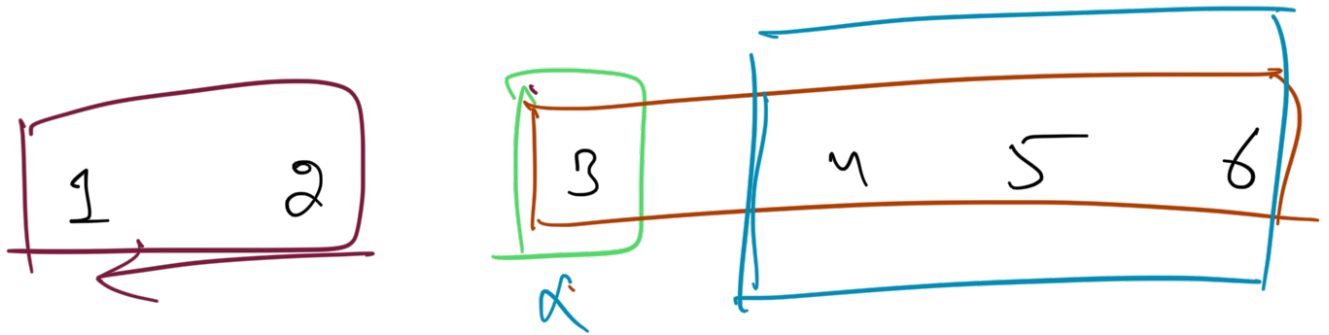
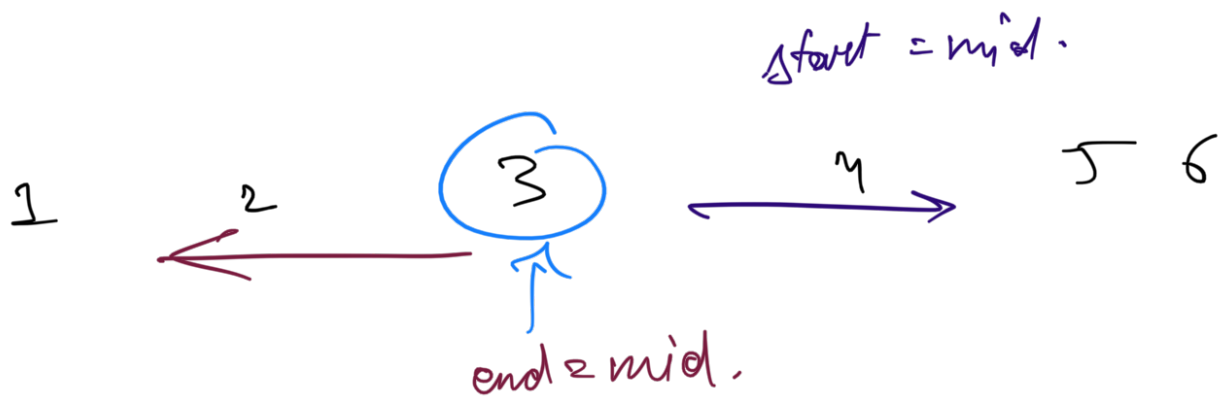
$$\begin{aligned}
 \text{mid} &= (2 + 5) // 2 \\
 &= 3
 \end{aligned}$$

\rightarrow false

$\rightarrow \text{start} = \text{mid}.$



$a[\text{mid}] == \text{target}$
 \rightarrow true.



7 billion $\rightarrow 7 \times 10^9$

linear-search \rightarrow linear(x)
 binary-search \rightarrow $\log(x)$

$\log_2(7 \times 10^9) \cong 33$