

Primality Testing

1) $i = 2 \dots N-1 \dots \%$

2) $i = 2 \dots \frac{N}{2} \dots \%$

3) $i = 2 \dots \sqrt{N} \dots \%$

$O(N)$

$O(N)$

$O(\sqrt{N})$

~~$a \times a = N$~~

$N = 18$

$N = 16$

$a = 1,$

$a = 2,$

$a = 4,$

$b = 4,$

$b = 8,$

$b = 16$

1,

2,

3,

6,

9,

18

$\boxed{3} \times 6 = 18$

$6 = \frac{18}{3}$

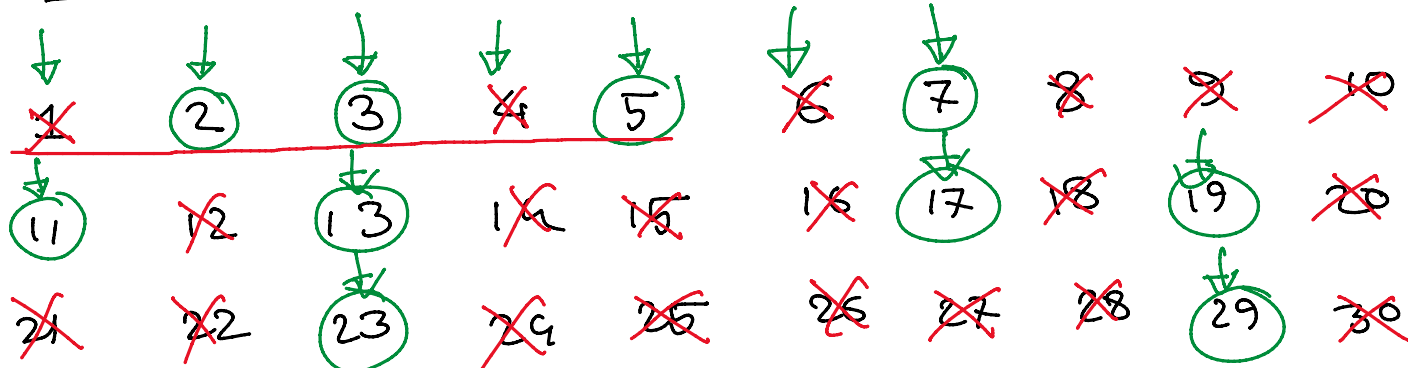
$N \leq 10^{12} \xrightarrow{\sqrt{N}} 10^6$

$N \leq 10^{14} \xrightarrow{\sqrt{N}} 10^7$

$N \leq 10^{18} \xrightarrow[k=7 \sim 8]{O(k \log N)} \text{(Miller-Rabin)}$
99.99%

Sieve of Eratosthenes

1 ~ N (Prime Generate)



2..... $\frac{N}{2}$
 3..... $\frac{N}{3}$
 4..... $\frac{N}{4}$
 5..... $\frac{N}{5}$
 6..... $\frac{N}{6}$

$$\frac{N}{2} + \frac{N}{3} + \cancel{\frac{N}{4}} + \frac{N}{5} + \cancel{\frac{N}{6}} + \dots + \frac{N}{N}$$

$$= N \left(1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \frac{1}{5} + \dots \right)$$

$$= N \cdot (\log_2 N)$$

bool isComp[100000000]

is Comp[0] = "00000660"
 ↑ ↑ ↑ ↑
 8 4 3 2 1

$10^8 \rightarrow$ variable \rightarrow boolean \rightarrow 8 bit

1B \rightarrow True
 False

10^8 B

ANS % (10 + 7)

10 % M

14 % M

P

Prime Number !!

$N > P$

$N \% P$

$$\pi(n)$$

— 0 —

$$[L, R] \quad 1 \leq L \leq R \leq 10^{18}$$

$x \rightarrow$ maximum amount of SET bits

$$2^n - 1 = (1111111)_2$$

$$[10, 15]$$

$$2^7 - 1$$

$$2^n = (10000 \dots 0)$$

$$\bullet (1111111111111111)$$

60

— 0 —

$$[L, R]$$

$$res = L \rightarrow (00 \underline{0} \underline{1} \underline{0} \underline{0} \underline{0} \underline{0} \underline{1} \underline{0} \underline{0}) \leq R$$

$$\vdots L+k \rightarrow (1111111111111111)$$

$$\vdots R \rightarrow (0000000000000000)$$