Opt-1

15 October 2022 09:14

6

1, 2, 3, 4, 5, 6

count = 4 of factors

2 → Prime

> 2 → Not Prime

2 factors → 1 & number itself

Divid = Divisor × Qt + rem

factors? 1, 2, 3, 6

$6 = 1 \times 6 + 0$

$6 = 2 \times 3 + 0$

$6 = 3 \times 2 + 0$

$6 = 4 \times 1 + 2$

$6 = 5 \times 1 + 1$

$6 = 6 \times 1 + 0$

1st optimisation → 1 & number → Hmesha factors of n

2, 3, 4, 5

Working Space

↓

Limit

6

$6 = 2 \times 3 + 0$

$6 = 3 \times 2 + 0$

$6 = 4 \times 1 + 2$

$6 = 5 \times 1 + 1$

Count of factors -

0 → Prime

> 0 → Not prime

2, 3, 4, 5, 6

Count of factors = 0

7 → Prime

$7 = 2 \times 3 + 1$

$= 3 \times 2 + 1$

$= 4 \times 1 + 3$

$= 5 \times 1 + 2$

$= 6 \times 1 + 1$

cof = 0 × 2 i = 2 n = 1

while (i < n)

2

6

2 < 6 ✓

rem = 0

NOT A PRIME

i = 3

rem = 0

NOT A PRIME

i = 4

rem ≠ 0

NOT A PRIME

2 < 1

Opt2

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Prime Optimisation -2

↳ break ; → loop break

↳ escape krne ka tarika

keyword

↳ special

- int while ✗
- int break
  int system
  int for
  int int ;

6

2, 3, 4, 5

↑ ✗

rem == 0 ✓

2 is a factor

↳ Don't check 3, 4, 5

break ;

while ( ) {

break ;

}

break ;

i =

while (i < n) {

rem = i % i ;

if (rem == 0) {

break ; →

}

i = i + 1 ;

}

i = 7

i = ?

6

i = 2

2, 3, 4, 5, 6

↓

Nahi Milla

↓

i == n

↓

Prime

n = 5

i = 2

while (i < n) {

int rem = n % i ;

if (rem == 0) {

break ;

}

i = i + 1 ;

}

print (i) → 5

↳ (i == n) → Prime

i = 2	i = 3	i = 4	i = 5
r = 1	r = 2	r = 1	loop ✗
b ✗	b ✗	b ✗	

n = 6

i = 2		n = 9	i = 3
loop ✓	✗ ✗	i = 2	✓
		loop ✓	0
		rem = 1	

n = 6

i = 2

```
while (i < n) {
int rem = n % i;
if (rem == 0) {
    break;
}
i = i + 1;
}
print(i) → 2
```

(i == 2) → Not Prime X

i == 3 X

((i == 2) || (i == 3))

Prime Optimisation-3

2 - 22 →

23

Claim

↳ 2 → n-1 ✗

2 → $\sqrt{n}$

(36) 6 → 7(49)

$\sqrt{45}$ → 3, 5, 9, 15

3×15

5×9

24, → 2, 3, 4, 6, 8, 12

2×12 → ✓ 4×6 ✓

12×2 → ✗ 6×4 ✗

3×8 ✓

8×3 ✗

(6 ——)

36 → 2, 3, 4, 6, 9, 12, 18

↓

2×18

3×12

4×9

6×6

2-6 , ✗, ✗, ✓

$\sqrt{36}$ =6

2-6

$\sqrt{n}$

n-1 ✗

$\sqrt{n}$ → ($\sqrt{n}$ × $\sqrt{n}$)

↳ $\sqrt{n}$ se bada koi factor

i <= $\sqrt{n}$

$(i)^2$ <= n

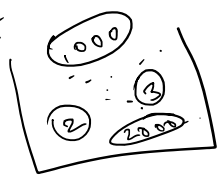
↓

i×i <= n ✓

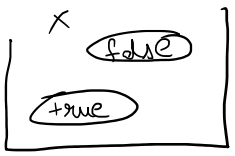
2 < 3

4 < 9

int



boolean ×



n = 3 4, 5, 6, . . .

i = 2

```
fM = false
while (i*i <= n) {
    Raam
    i += 1;
}
fM ? x
```

u <= 2 x

u <= 3 x

n = 2

HCF LCM

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GCD / HCF

8, 14

8 = 2 × 2 × 2

14 = 2 × 7

GCD = 2 ✓

8, 12

GCD = 4

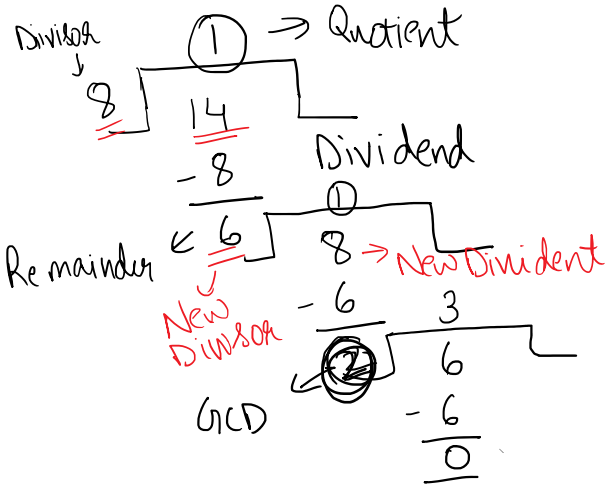
8 = 2 × 2 × 2

12 = 2 × 2 × 3

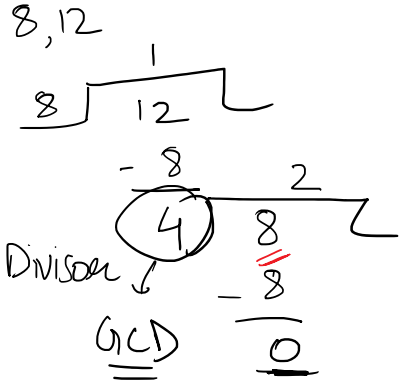
GCD = 2 × 2 = 4 ✓

Long Division

8, 14



8, 12



Long Division

LCM

22592, 1495 ✗

8, 16, 24, 32, 40, 48, 56, ...

12, 24, 36, 48, 60 . . . . . ✗

LCM

$n1 \times n2 = HCF \times LCM$

$LCM = \frac{n1 \times n2}{HCF}$ ✓

$\frac{28 \times 12}{4} = 24$ ✓

$\frac{8 \times 14}{2} = 56$ ✓

14, 28, 42, 56

(12, 8

divid = 12 4

div = 8 4

rem = 0

Ans = 4 ✓

12 = 8 × 1 + 4

8 12

dividend = 8 8

divisor = 12 8

8 = 12 × 0 + 8

rem = 8

rem = 0

8, 12

divid = 8 12 8

div = 12 8 4

rem = 8 ✓

rem = 4

8, 12

dividend = 8 8

divisor = 12 8

rem = 8

rem = 0

0
12 | 8
- 0
8 | 12

GCD == 8? ✗

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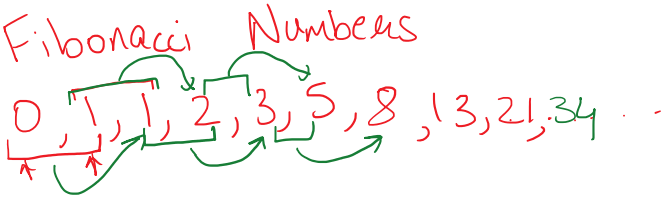
Fibonacci Numbers



Repeat?

0th 1st 2nd 3rd 4th 5th 6th 7th

0, 1, 1, 2, 3, 5, 8, 13, 21, 34

?

nth Fibonacci