06 July 2023 11:10

Q1)
```
for( i = 0; i^2 <= n; i++){
    sysо(i)
}
```

$i^2 <= n$	i
$i <= \sqrt{n}$	
1	1
2	2
3	3
i	i

Q2)
```
for( i = 1 ; i <= n ; i++ ){
    for( j = 1 ; j <= i ; j++ ) {
        for( k = 1 ; k <= 1000 ; k++) {
            sysо( ?? )
        }
    }
}
```

$i = 1$: $j \to 1$ to 1 → 1000 → $1 \cdot 1000$

$i = 2$: $j = 1 \mid 2$ → $1000 \mid 1000$ → $2 \cdot 1000$

$i = 3$: $j = 1 \mid 2 \mid 3$ → $1000 \mid 1000 \mid 1000$ → $3 \cdot 1000$

$i = n$: $j = 1 \cdots n$ → $n \cdot 1000$

$$f(n) = 1000 + 2 \cdot 1000 + 3 \cdot 1000 + \cdots n \cdot 1000$$

$$1000\,(1 + 2 + 3 + \cdots + n) = \frac{n \cdot (n+1)}{2}\, 1000$$

$O(n^2)$

$1 + 2 + 3 + \cdots + n = S_n$

$n + (n-1) + (n-2) + \cdots + 1 = S_n$

$n(n+1) \cdots \cdots = 2S_n$

$S_n = \frac{n \cdot (n+1)}{2}$

Q3
```
for( i = 1 ; i <= n ; i++) {
    for( j = 1 ; j <= i^2 ; j++) {
        for( k = 1 ; k <= n/2 ; k++) {
            sysо( Dry run karo)
        }
    }
}
```

$i = 1$: $j = 1$ → $n/2$

$i = 2$: $j = 1 \mid 2$ → $n/2 \mid n/2$

$i = 3$: $j = 1 \mid 2 \mid 3$ → $n/2 \mid n/2 \mid n/2$

$i = 4$: $j = 1 \mid 2 \mid 3 \mid 4$ → $n/2 \mid n/2 \mid n/2 \mid n/2$

$i = n$: $n^2 \cdot n/2$

$$n/2 + 4 \cdot n/2 + 3^2 \cdot n/2 + \cdots n^2 \cdot n/2$$

$$n/2\,(1 + 2^2 + 3^2 + \cdots n^2)$$

$$n/2 \cdot \frac{n(n+1)(2n+1)}{6} \to O(n^4)$$

Q 4)
```
for(i = 1 ; i ≤ n ; i = i x 2) {
    syso( kya hai - )
}
```

Q 5)
```
for( i = n/2 ; i ≤ n ; i++) {
    for( j = 1 ; j ≤ n/2 ; j++) {
        for( k = 1 ; k ≤ n ; k = k * 2) {
        }
    }
}
```

$(\lg a)^2$

Q
```
for ( i = n/2 ; i ≤ n ; i++) {
    for ( j = 1 ; j ≤ n ; j = j x 2) {
        for ( k = 1 ; k ≤ n ; k = k x 2) {
            syso( ?? )
        }
    }
}
```

Q
```
for (i = 1 ; i ≤ n ; i++) {
    for( j = 1 ; j ≤ n ; j = j + i ) {
        syso ( Copy par karo
    }
}
```

---

i = 1	i = 2
j = 1 to n ; j = j + 1	j = 1 to n ; j = j + 2

$\sum \frac{1}{n} = \log n$

$j = 1 \text{ to } n \; ; \; j = j+1$ — n

$j = 1 \text{ to } n \; ; \; j = j+2$ — $n/2$

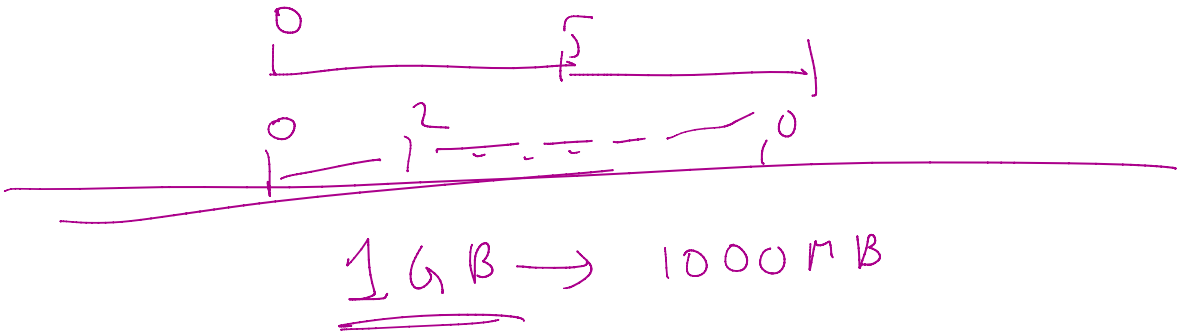
$i = 3$ — $n/3$; $i = 4$ — $n/4$; $i = 5$ — $n/5$; $i = n$ — $n/2$

$$\frac{n}{1} + \frac{n}{2} + \frac{n}{3} + \cdots \frac{n}{n} = n\left(1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4}\right)$$

$\in n \log n$

(1) `for ( i = 1 ; i ≤ n ; i = i + k ) {`
`for (j = 1 ; j ≤ k ; j++) {`

$n = 10, \quad k = \lceil \sqrt{10} \rceil = 4$



1 GB → 1000 MB

1 MB → 1000 KB

1 KB → 1000 B

1 GB → 10^9 || 1 GHz → 10^9 Hz