

Time Complexity

67 July

```
Scanner ob = new Scanner(System.in);  
int a = 10; C1
```

```
int N = ob.nextInt(); C2
```

```
for (int i = 1; i <= N; i = i * 2) C3  $\log_2 N$   
    System.out.println(i)
```

```
for (int i = 1; i <= N; i++) C4  $O(N)$   
    System.out.println(i)
```

~~$C1 + C2 + C3 +$~~

$C1 + C2 + C3 \times \log_2 N + C4 \times \log N$

$O(1) \{O(1) \quad O(\log N) \quad O(N)\} \Rightarrow O(N)$

$O(1) < O(\log N) < O(N) < O(N \log N) < O(N^2)$

$< O(N^3) < O(N!)$

```
System.out.println("Hello"); O(1)
```

```
System.out.println("Hello");  
System.out.println("Bye");  
System.out.println("go away");
```

} $O(1)$

```
for (i = 1; i <= N; i = i * 2)  
    System.out.println("Hello");  $\Rightarrow O(\log N)$ 
```

```
for (i = 1; i <= N; i++)  
{  
    System.out.println("Hello");  
}
```

$\Rightarrow O(N)$

```
for (i = 1; i <= N; i = i + 2)  $\Rightarrow O(N)$   
    System.out.println("Hello");
```

```

for (i = 1; i <= N; i++)
{
    for (j = 1; j <= N; j = j * 2) =>  $O(N \log N)$ 
        System.out.println("Hello");
}

```

```

for (i = 1; i <= N; i++)
{
    for (j = 1; j <= N; j++) =>  $O(N^2)$ 
        System.out.println("Hello");
}

```

```

for (i = 1; i <= N; i++)
{
    for (j = 1; j <= N; j = j + 2) =>  $O(N^2)$ 
        System.out.println("Hello");
}

```

```

for (i = 1; i <= N; i++)
{
    for (j = 1; j <= N; j++)
    {
        for (k = 1; k <= N; k++) =>  $O(N^3)$ 
            System.out.println("Hello");
        }
    }
}

```

Time Complexity

- 1) for worst case
- 2) very large Input
- 3) Remove the Constant

Space Complexity

int a=10, b=7, c;

c = a+b;

Soflen (c);

12 Byte

Q// WAP that read N number in an array and display largest and Second largest element of an array.

Q// WAP that read N number in an array and display smallest and Second smallest element of an array.