

DAY-1 ASSIGNMENT | 24th December, 2020

1. Find the time complexities of the following scenarios.

a) `for(i=1;i<=n;i++)` ----- n
`{`
`for(j=i;j<=n;j++)` ----- n
`printf("Hi");`
`}`

- Here the first line of above code 'for(i=1;i<=n;i++)' should iterate for n times, so it alone takes n time to complete.
- And, the second line of code 'for(j=i;j<=n;j++)' should also iterate for n times, so it also takes n time to complete and prints the message 'Hi'.
- For printing 'Hi', it takes $O(1)$ time
- The total complexity of the code is $O(n) * O(n) = O(n^2)$.

b) `for(i=1;i<=n;i*=3)`
`{`
`for(j=1;j<=n;j++)`
`printf("Hello");`
`}`

- Here the first line runs $\log n$ times because it makes a series 3, 3^2 , 3^3 ,, 3^k (Assume last is k).
- Let us suppose that $i > n$
 Now, $k = (\log n)$ to base 3.
 So the time complexity is $O(\log n)$.
- And line 2, the inner loop will run a max of n-1 times for each outer loop iteration.
 Time complexity is $O(n-1) = O(n)$
- Line 3 is of constant complexity $O(1)$.
- Total time complexity is $O(\log n) * O(n) * O(1) = O(n \log n)$.