**1.) Find the time complexity for the following scenarios**

**a.) for(i=1;i<=n;i++)**

**for(j=i;i<=n;j++)**

**printf("Hi");**

When i=1, j loop will run upto n times. When i=2, j loop will run upto n-1 times like as follows:

|  |  |
| --- | --- |
| i | j |
| 1  2  3  .  .  .  .  n-2  n-1  n | n  n-1  n-2  .  .  .  .  3  2  1 |

Time complexity= n+(n-1)+(n-2)+………+3+2+1

= Sum of n natural numbers

= n(n+1)/2

= (n2+n)/2

Hence, time complexity for the above code is **O(n2)**

**b.) for(i=1;i<=n;i\*=3)**

**for(j=1;i<=n;j++)**

**printf("Hello");**

When i=1, j loop will run upto n times. When i=3, j loop will run upto n times like as follows:

|  |  |
| --- | --- |
| i | j |
| 1  3  9  27  .  .  .  .  k times | n  n  n  n  .  .  .  .  k times |

To find the value of k:

1+31+32+33+………………..+3k=n

(3k-1)/(3-1) =n [G.P Series]

From here, we get,

k=log3 n

Time complexity= n+n+n+……………..k times

= n\*log3 n

Hence, time complexity for the above code is **O(nlog3 n)**