

Data Structure Tutorial - 2

Q1

(i) $O(n)$

lets take the value of $n=16$ in first for loop
second loop depends on the value of i .
so execution goes like.

i	j
16	16
16/2	8
8/2	4
4/2	2
2/2	1

$$\text{Time}(n) = O\left(n + \frac{n}{2} + \frac{n}{4} + \dots + 1\right)$$

$$= \underline{\underline{O(n)}}$$

(ii) Here first loop runs n times and the inner loop runs $\log n$ times

$$\therefore O(n \log n)$$

(iii) Here the first loop n times and the inner loop runs only one time because of break statement.

$$\therefore O(n)$$

(iv) Here in this case both the loop goes n times

$$\therefore O(n^2)$$

(v) Here the outer i^{th} loop will run n no. of times and both the inner loops i.e. j^{th} and k^{th} loop run $\log n$ times

$$\therefore O(n \log^2 n)$$

(vi) This piece of code is a bubble sort algorithm

$$\therefore O(n^2)$$

(vii) Here i^{th} for loop can run n times
 j^{th} for loop can run n times
 k^{th} for loop can run n times

$$\therefore O(n^2 \log n)$$

(viii) This is a code for selection sort

$$\therefore O(n^2)$$

Q₂:

$$\begin{aligned} &1 \\ &\sqrt{\log n} \\ &\log \log n \\ &\sqrt{e}^{\log n} \\ &n^{1/\log n} \\ &(3/2)^n \\ &(n+1)! \end{aligned}$$