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Let's upgrade Assignments

Master Data Structure & Algorithms

Day 1

1.
```
int a=0
for(int i=0; i<n; i++)
{
    for(int j=n; j>i; j--)
    {
        a=a+i+j;
    }
}
```

Sol^n

Time complexity for the first loop is - O(n)

For the second loop

i	j
1	n, n-1, n-2 - - - - 1
2	n, n-1, n-2 - - - 2
=	
=	
=	
n	1

Time complexity of second loop - O(n)

∴ Time complexity - $O(n^2)$

GOOD WRITE

2.
```
int count = 0
for (int i = 1; i <= n; i = i*2)
    {
        for (int j = 1; j <= i; j++)
            {
                count = count + 1;
            }
    }
```

Sol^n

For outer loop

Time complexity - $O(\log n)$

For inner loop

i	j
1	1, 2
2	1, 2
4	1, 2, 3, 4
6	1, 2, 3, 4, 5, 6
.	
n	1, 2, 3, - - - - - , n

$\Rightarrow 1+2+4+8+ \ldots + n$

$2^0 + 2^1 + 2^2 + 2^3 + \ldots + 2^n$

By G.P. series

$= 1\left(\frac{1-2^{(\log n+1)}}{1-2}\right)$

$= 2^{\log n} \Rightarrow n$

GOOD WRITE

$\therefore O(n)$

3. Find the best, average and worst case in linear search algorithm.

Sol^n In linear search algorithm

Best case => $O(1)$

Worst case => $O(n)$

Average case => $\frac{O(1) + O(n)}{2}$

$\Rightarrow \frac{1+n}{2}$

$\Rightarrow n$ [neglecting the co-efficients]