DAY-1: 19-10-2020 **MODULE -1 : ASSIGNMENT-1**

1. What is the time complexity of following function fun()?

Assume that log(x) returns log value in base 2.

```
void fun()
{
   int i, j;
   for (i=1; i<=n; i++)
      for (j=1; j<=log(i); j++)
         printf("Welcome to the course");
}
```

Time complexity = O (n) * O (log(n)) = O (n log(n))

2. What is the time, space complexity of following code:

```
int a = 0, b = 0;
for (i = 0; i < N; i++) {
    a = a + small();
}
for (j = 0; j < M; j++) {
    b = b + small();
}
```

Time complexity = O(N) + O(M) = O(n)
Space complexity = O(1)

3. What is the time complexity of following code:

```
int a = 0;
for (x = 0; i < N; x++)
{
    for (y = N; y > x; y--)
        {
```

Time complexity = n(n+1)/2 = O(n2)

```
        a = a + x + y;
    }
}
```

4. What is the time complexity of following code:

```
int i, j, k = 0;
for (i = n /  2; i  <= n; i++)  {
    for (j = 2; j <= n; j = j * 2) {
        k = k + n / 2;
    }
}
```

Time complexity = n/2 * log(n) = O (n log(n))

5) What is the complexity of the code given below?

a.

```
for (int i = 1; i <=n; i *= c) {
        // some O(1) expressions
   }
```

Time complexity = log(n) ('i' increase exponentially) Space complexity = O (1) (since only one integer)

b.

```
   for (int i = n; i > 0; i /= c) {
        // some O(1) expressions
   }
```

Time complexity = log(n) ('i' decrease exponentially) Space complexity = O (1) (since only one integer)

6) What is the complexity of the code given below?

a. // Here d is a constant greater than 1

```
for (int i = 2; i <=n; i = pow(i, d)) {
        // some O(1) expressions
   }
```

Time complexity =log(log(n)
('i' increase exponentially by constant) Space complexity= O (1)
(only one integer are declared

b. //Here fun is sqrt or cuberoot or any other constant root

```
for (int i = n; i > 1; i = fun(i)) {
    // some O(1) expressions
}
```

Time complexity = log(log(n))
(the value of 'i' decrease exponentially)
Space complexity= O (1) (only one integer are declared)

7) What is the complexity of the code given below?

```
while (x > 0) {
  x /= 2;
}
```

Time complexity = log(n)
(if the value of 'i' decrease exponentially) Time complexity =log(1)
(if the value of x is zero)

8) What is the complexity of the code given below?

```
function O_SQRT(n)
{
   count = 0;
   for (var i = 1; i * i < n; i++)
        {
      count++;
   }
   return count
}
```

Time complexity = log(n)
(i increases exponentially)

9) Arrange the following order of complexity of algorithms in increasing order of growth.

- Constant time
- Linear time
- Logarithmic time
- Polynomial time
- Exponential time
- Factorial time

1) Constant time
2) Logarithmic time
3) Linear time
4) Polynomial time
5) Exponential time
6) Factorial time

Recoverable Signature

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