Time Complexity

##Worst case consider korte hbe…..

Write the time complexity of each of the code segments shown below.

1.
```
int k=1;
while(k<=n){
    cout<<k<<endl;
    k=k*2;
}
```

Answer:

Time Complexity: O(n)

Space Complexity: O(1)

2.
```
for (int i = 0; i < n; i++)
    for (int j = i; j > 0; j--)
    cout << i << j;
```

Answer:

Time Complexity: O(n^2)

Space Complexity: O(1)

I=0 , j=0, ---→0

I=1, j=1; ----→1

I=2,j=2;-----→2

……..

I=n, j=n;-----→n*n-→n^2

3.
```
for (int i = 0; i < n; i++)
    for (int j = i; j > 0; j--)
        for(int k=j; k > 0; k--)
        cout << i << j << k;
```

Answer:

Time Complexity: O(n^3)

Space Complexity: O(1)

I=0 , j=0, k=0---→0

I=1, j=1; k=1----→1

I=2,j=2;k=2-----→2

……..

I=n, j=n;k=n-----→n*n*n -→n^3

4.
```
for(int i=n/2;i<=n;i++){

    for(int j=1;j<=n;j=j*2){
            cout<<i<<j<<endl;
    }
}
```

n ber er jnne vitor er loop ta logn ber Ghurbe….. jmn… 8 er jnne vitor er loop ta 3 ber ghurbe… 8=log2^3=3

Answer:

Time Complexity: O((n/2) *logn) = O(nlogn)

Space Complexity: O(1)

I=5 , j=1, ---→6

I=6, j=1; ----→6

I=7,j=1;-----→6

5.
```
for(int i=n/2;i<=n;i++){------n/2
    for(int j=1;j<=n;j=j+i){--------n
        cout<<i<<j<<endl;
    }
}
```

Answer:

Time Complexity: O((n/2) *n) = O(n^2)

Space Complexity: O(1)

I=5 , j=1, ---→1

I=6, j=1; ----→1

I=7,j=1;-----→1

6.
```
for(int i=1;i<=n;i++)
{
    if(builtin_popcount(i) == 1)
    {
        for(int j=1;j<=n;j++)
            cout<<i<<j<<endl;
    }
}
```

Answer:

Time Complexity: O(n^2)

Space Complexity: O(1)

I=1 , j=1, ---→n----→n^2

I=2, j=1; ----→n----→n^2

I=3,j=1;-----→0----→n

I=4,j=1;-----→n----→n^2

I=5,j=1;-----→0----→n