**DataStructure Introduction assignments**

Mandatory

1. Refer the code below and estimate the time complexity.

a.

for(i= n ; i > 0; i++){

for(j = 0; j<n;j\*2){

cout<<i;

}

}

Ans. The outer loop runs i from n down to 1, so it iterates **n times**.

The inner loop starts j from 0 and increments by multiplying j by 2 after each iteration.

* + However, since j = 0 initially, it will **never satisfy j < n**, and the inner loop does **not run even once**.

**Time Complexity:**

* The inner loop runs **0 times** for each iteration of the outer loop.
* Thus, the **total complexity is O(n) for the outer loop**, but no operations are performed inside.
* Final **time complexity: O(n)**.

b.

for(i= n ; i > 0; i++){

//some operation here

}

//m > n

for(j = 0; j<m;j++){

//some operation here

}

Ans. **Analysis:**

The first loop runs i from n down to 1, so it iterates **n times**.

* + Each iteration performs a constant-time operation, so this contributes **O(n)**.

The second loop runs j from 0 to m-1, so it iterates **m times**.

* + Each iteration performs a constant-time operation, so this contributes **O(m)**.

**Time Complexity:**

* The two loops are **independent**, so the total complexity is the **sum** of the complexities of the loops.
* **Final time complexity: O(n + m)**.