**CS2413: Data Structures**

**Fall 2021**

**Homework #1**

* Full name only: NAFIZ IMTIAZ
* Release date: Aug 27th, 2021 (Friday)
* Due date: **Sept 2nd, 2021 (Thursday) before midnight, 11:59 PM**
* It should be done INDIVIDUALLY; Show ALL your work; Write your answer in a Word file and submit it through the blackboard
* Total: 10 pts

1. Explain the meaning of the expression, f(n) is O(1).
   1. pts]

**O (1) means that it will take a constant time despite having different the amount of data in the set. It does not matter how big the data is. The execution time will always be in the order of 1 which means the big-0 complexity will be in the order of 1.**

1. Analyze the running time and find the computational complexity (Big-Oh will do) of the following code. Show all your work.

[4 pts]

for (cnt2 = 0, i = 1; i <= n; i ++) for (j = 1; j <= i; j ++)

cnt2 ++;

**Running time will be O(n2).**

**In this nested loop, the inner loop runs n times for every iteration of the outer loop. So total number of nested loop iteration = total number of iteration of outer loop \* total number of iteration of the inner loop which is n\*n = n^2 = O (n2 ).**

First loop = 2n+3

Second loop = n(2n+2)

cnt2++ = n2

so,

2n+3 +n(2n+2) +n2

**= 3n^2 +4n +3**

**Hence, O(n^2). n^2 is the highest order in the equation.**

1. Order the following functions by growth rate.
   1. pts]

2n 1500 n lg n n3 lg n

From lowest to greatest

1500 lg n n lg n n3 2n