**CSCI 230 – Data Structures and Algorithms  
Fall 2019  
Lab 1: Algorithmic complexity**

**Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Exercise 1**

Use the formal definition of Big-O to show the following:

* 1. Given T(n) = *n*2 + 5*n* + 25, show that this is O(*n*2)
  2. Given that T(n)=n2+n2log(n), find the Big-O upper bound based on the simplification rules and then show that it is correct based on its definition.
  3. Given that T(n)=n3+n2log(n) find the Big-O upper bound based on the simplification rules and then show that it is correct based on its definition.
  4. Given that T(n)= (nlog(n)+n2) (n+log(n)) find the Big-O upper bound based on the simplification rules and then show that it is correct based on its definition.

**Exercise 2**

Given that T(n) = n 1/2, use the definition of Big-Ω to show that T(n) is Ω( lg n).

**Exercise 3**Given that T(n) = 73n3+ 22n2+ 58 use the definition of Big-Θ to show that T(n) is Θ( n3 ).