Algorithms Homework #1 Due: 4/10/2018

1. For the summation problem: sum (n) = 1 + 2 + … + n
2. Use recursive design method to design an algorithm
3. Determine the time complexity of the algorithm
4. Prove by finding constants that satisfy the definition of order of magnitude, that *f* = Θ(*g*) if *f*(*x*) = 3*x**－* 7*x* and g(*x*) = *x*.
5. State whether each of the following is true or false:

a) 7lg *n +* 16= *O* (*n*)

b) (lg *n*)= *O* (*n*) , *k* is a constant

1. Ordering by asymptotic growth rates

*n* ! (lg *n*) ! lg ( *n* ! ) lg\* *n* 2 lg *n* 2*n* *n*2

Hint: Stirling’s approximation

5. Solve the recurrence with T(n) = *c* , if n =1:

* 1. T(n) = T(n-1) +Θ(1)
  2. T(n) = T(n-1) +Θ(n)
  3. T(*n*) = 3T(*n*/2) +  (using Master method)