

CS 2123
Summer 2014

Homework 5

Assigned: 7/14/2014

Due: 7/21/2014 11:59 pm

1. Growth analysis (20 pts)

For each of the below algorithms, answer the following questions:

1. describe its growth function with as much detail as possible in terms of n (you don't have to specify any constants)
2. what is its simplified bounding function (the big O)?
3. using its bounding function, how much slower does the algorithm become as n grows from 150 to 500,000 elements? (SHOW YOUR WORK)

a. critical statement is assignment

```
for(i = 0 to n - 1) {  
    c = i + 1  
    for(j = c to n) {  
        arr[j] += arr[i];  
        for(k = c to 0 step -1)  
            arr[k] *= arr[j];  
    }  
}
```

b. critical statement is comparison

```
while(n > 0) {  
    m = n;  
    while(m) {  
        if(m & 0x01)  
            c++;  
        m = m >> 1;  
    }  
    n--;  
}
```

2. Quadratic selection sort (40 pts)

Exercise 6.3.2. in the textbook.

This needs to be a complete C program. Your program should read a provided data file, sort it, and print out the sorted results.

3. Two-way insertion sort (40 pts)

Exercise 6.4.1. in the textbook.

This needs to be a complete C program. Your program should read a provided data file, sort it, and print out the sorted results.

Deliverables:

The answer to homework problem 1 should be typed and submitted in a single document.

Problems 2 and 3 should be submitted as one or more C source code files. I need all of the C source that you produce for this assignment problem so that I may compile and execute it.

Archive and submit the files to UTSA's Blackboard system.