# **CSE 310 Recitation 2**

## **Objectives:**

- 1. Review on Bubble sort and Binary search algorithm
- 2. Exercise on asymptotic upper bound (Big-O), lower bound (Big- $\Omega$ ) and Big- $\Theta$

#### Instruction

- 1. For all recitation: the solution should be clearly typed or written and must be saved in .pdf or .jpg format. Note: unreadable answer receives no credits!
- 2. All recitation must be submitted through the link posted on Blackboard, we do NOT accept any hand-in submissions or submissions sent through emails!

### Question

1. [3 pts] For the following Bubblesort algorithm, how many times would the inner for loop iterate (give the closed form)? What is the worst-case running time of Bubblesort?

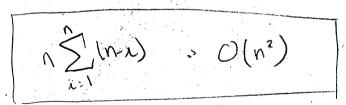
## BUBBLESORT(A)

```
for i = 1 to A.length-1 - n + mcS

for j = A.length downto i+1

if A[j] < A[j-1]

exchange A[j] with A[j-1]
```



2. [2 pts] Give the Big-O (upper bound), Big- $\Omega$  and Big- $\Theta$  notation of the following functions.

a. 
$$f(n) = n + 5n^{0.5}$$

$$0(n)$$

$$0(n)$$

$$0(n)$$

b. 
$$f(n) = 3n^2 + 5n + 1$$
  

$$O(n^2)$$

$$O(n^2)$$

$$G(n^2)$$

3. [5 pts] For the following Binary search algorithm, write its recurrence equation and solve it by giving an asymptotic upper bound.

BINARYSEARCH(A, I, r, key) //Array, left, right and the search key if  $l \ll r$ 2 m = (l+r)/23 if A[m] == key4 return m 5 if A[m] < keyelse return BINARYSEARCH(A, m+1, r, key) Syolits n/2 6 else return BINARYSEARCH(A, I, m-1, key) Splits 1/2 T(n)= T(n/2) + C, 17(n) 11 TT(n/2)

iti(1) C, ign