

CSE 310 Recitation 1

Objectives:

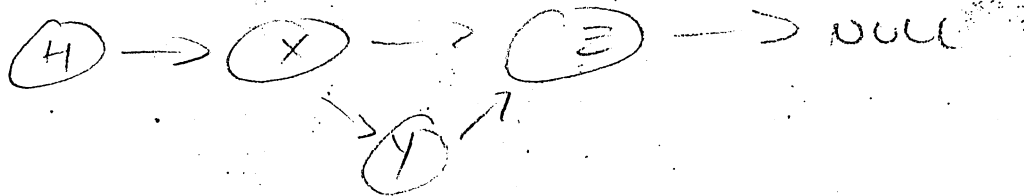
1. Review on LinkedList data structure and Binary search algorithm

Instruction

1. For all recitation exercise, we highly recommend that you submit a typed solution with the original questions inside; in case you don't have enough time to do so, a hand-written one is acceptable only when: **the solution is clearly written and must be saved in .pdf or .jpg format. Note: unreadable answer receives no credits!**
2. All recitation exercises must be submitted through the link posted on Canvas, we do NOT accept any hand-in submissions or submissions sent through emails!

Question

1. [5 pts] Suppose that you're given the head pointer H to a singly-linked list, and a pointer X to one of the nodes in the list. You're now given a pointer to a new node Y . Write a C++ code to insert Y into the given linked list, just after the node X . Assume any reasonable structure for the nodes in the linked list (e.g., each node must have a "next" pointer pointing to the next item on the list).



$Y \rightarrow \text{next} = X \rightarrow \text{next};$
 $X \rightarrow \text{next} = Y;$

2. [3 pts] What function is computed by the function $Mystery(n)$ below? Express your answer as a summation and then give its closed form in terms of n .

```

Mystery ( n ){
    sum=0;
    for ( i=1; i <= n ; i++)
        for ( j=1; j <= i ; j++)
            sum++;
    return ( sum );
}

```

$$\sum_{i=1}^n i = \boxed{\frac{n(n+1)}{2}}$$

3. [2 pts] Suppose you have a sorted array $A[0, n-1]$. What are the number of comparisons to search for the existence of an element x in the given array using binary search? $T(n) = T(n/2) + C_0$

| | Total | Level |
|---|-------|-------|
| $T(n)$ \parallel C_0 | C_0 | 0 |
| $+$ $T(n/2)$ \parallel C_0 | C_0 | 1 |
| $+$ $T(n/4)$ \parallel C_0 | C_0 | 2 |
| \vdots $T(1)$ | | |

$$\sum_{k=1}^{\lg n} C_0 = C_0 \lg n$$

$$\Rightarrow \boxed{O(\lg n)}$$