

CSE 202 Midterm 1

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I. QUESTION (ALGORITHM ANALYSIS) (15 POINTS)

Given the following function

```
int magic(int N){
    sum = 0;
    for (i = 0; i < N; i++)
        sum++;
    for (i = 1; i < N; i++)
        for (j = 1; j < N; j++)
            if (i % j == 0)
                sum++;
    for (i = 0; i < N; i++)
        for (j = 1; j < N; j *= 2)
            sum++;
    return sum;
}
```

What is the time complexity of magic?

II. QUESTION (ALGORITHM ANALYSIS) (15 POINTS)

Given the following function

```
int magic2(int N){
    sum = 0;
    for (i = 0; i < N; i++)
        sum++;
    return magic2(N / 2) + sum;
}
```

What is the time complexity of magic2?

III. QUESTION (LINKEDLIST) (15 POINTS)

Write the method

```
void deleteAll(int X)
```

which deletes all nodes having value X from a singly linked list.

IV. QUESTION (LINKEDLIST) (20 POINTS)

Write the method

```
boolean subList(LinkedList sub)
```

which checks if the original list contains the elements of sub in the same order.

V. QUESTION (STACK) (20 POINTS)

Write the method

```
int multiply()
```

which pops the last two items of a stack and returns the product of those two popped numbers. You are not allowed to use pop, push functions. Write the function for both link list and array implementations.

VI. QUESTION (STACK) (15 POINTS)

Write the method

```
void removeBottom()
```

which removes only the bottom element of the stack. You are only allowed to use pop, push, isEmpty functions (Hint: Use external stack).