

CSE 202 Midterm 1

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I. QUESTION (LINKLIST) (15 POINTS)

Write the method

```
void insertBeforeLast(Node newNode)
```

which inserts a new node before the last element in a single link list.

II. QUESTION (DOUBLELINKLIST) (15 POINTS)

Write the method

```
void removeBeforeX(DoubleNode X)
```

which removes the node before the node X in a double link list.

III. QUESTION (ALGORITHM ANALYSIS) (15 POINTS)

Given the following function

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

What is the time complexity of magic?

IV. QUESTION (ALGORITHM ANALYSIS) (15 POINTS)

Given the following function

```
int sihir(int N){
    sum = 0;
    for (i = 0; i < N; i++)
        sum++;
    return sihir(N - 1) + sum;
}
```

What is the time complexity of sihir?

V. QUESTION (STACK) (20 POINTS)

Write the method

```
void swap()
```

which swaps the last two items of a stack. 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

```
boolean matchParenthesis(String s)
```

which returns true if the characters in the string is a valid parenthesis expression, false otherwise. In a valid parenthesis expression, there is a matching closing parenthesis for each opening parenthesis in the appropriate position. For example, ({ () [{ }] } ()) is a valid parenthesis expression. You are only allowed to use pop, push, isEmpty functions. You can assume that there are only three types of parenthesis in each expression (, {, and [.