CSI 33 **Midterm Exam In-class Practice**

1. Consider the following program:

```
from LList import *
from random import randint

n = int(input("Enter a positive integer:"))

if n > 0:
     myList = LList()

     for i in range(n):
          myList.append(randint(0,1000))

     for i in range(n):
          tmp = myList.pop()
          myList.insert(0,tmp)

else:
     print(n,"is not a positive integer")
```

(a) What does the program do?
(b) Assuming that we keep the references to the **head** of the linked list and to the **last element** (**tail**) of the linked list and the user provides a valid input (a positive integer), give a **Theta analysis** of the *time efficiency* **T(n)** of the program. Justify your answer.

2. Given two sorted stacks, **st1** and **st2**, in *decreasing order* (the smallest element is at the top of the stack and the greatest element is at the bottom of the stack), create a new stack **st3**, which contains elements from both stacks, **st1** and **st2**, and is sorted in decreasing order as well. You can only use **Stack ADT** operations, you cannot access the underlying representation of the **Stack**.

3. Evaluate the valid **prefix** and **postfix expressions**:

(a) 2 3 2 ^ + 3 ^ 12 4 ÷ 5 × - 8 +

(b) ÷ √ ^ 3 2 ^ 4 2 + - 10 8 3

4. Re-write the algebraic expression in **infix notation** to its **prefix** and **postfix notations**.

$$\left(\frac{1}{2}+\frac{2}{3}+\frac{3}{4}+\frac{4}{5}+\frac{5}{6}\right)^4$$