

6.189 –Homework ONLY

Session 7

Administrivia

Name:

Instructions:

1. Err..complete the questions :).
2. When we ask for output, you DON'T have to write the spaces/newlines in.

Program Text:

```
print "X",  
print "X",
```

Output:

```
XX
```

Day 4: More Loop Practice

Problem 20:

Each of the following function definitions takes a list as a parameter and solves a specific problem. Correctly fill the blanks in the following code to solve the problems.

There is a way to solve each problem by only filling in the blanks. Don't just add extra lines to force a solution. Also, there may even be more elegant solutions that don't use all the blanks – feel free to use those too.

Program Text:

```
def swap_first_last(my_list):  
    """This function swaps the first and last elements in a list. It  
    has no return value."""  
    temp = _____  
    _____ = _____  
    _____ = _____
```

Program Text:

```
def second_biggest(my_list):
    """This function returns the second biggest element in my_list. It
    assumes that my_list contains distinct, positive integers."""
    second_biggest = -5
    biggest = -1
    for i in my_list:
        if i > _____:
            second_biggest = _____
            biggest = _____
        elif i > second_biggest:
            second_biggest = _____
    return second_biggest
```

Problem 13:

You may recall the notion of a power series from Calculus. A power series is an infinite polynomial series that approximates a continuous function. For example, the power series of $\sin(x)$ is

$$x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \dots$$

The more terms you calculate, the closer your expression will be to $\sin(x)$ – hence the reason we call it an approximation.

Write a function to calculate $\sin(x)$ using the above power series (well, fill in the blanks, at least.)

Note: You've already seen the code for a function that can calculate the factorial of a number (Problem 11.) Assume the existence of a $\text{factorial}(x)$ function that calculates the factorial of x .

Program Text:

```
def calculate_sin(x, number_of_terms):  
    "Calculates the value of sin(x) using the power series."  
    number_of_terms = min(20, number_of_terms) #do at most 20 terms  
    sin_value = 0  
    for i in range(number_of_terms):  
        new_term = x ** _____  
        new_term /= factorial(_____)  
        new_term *= (-1) ** _____  
        sin_value += new_term  
    return sin_value
```