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:

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

Output:

XX
Program Text:

```python
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

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

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 `factorial(x)` function that calculates the factorial of $x$. 
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