Name _______________________________________________________________

Question One. 25 points. Complete the function `generate()` below. The function should generate the specified number of random integers (that range from 1 to 100) and then return the average of the sum of those numbers.

```python
import random

def generate(how_many):
    how_many = int(input("How many random integers? "))
    answer = generate(50)
    print("The average of", how_many, "integers is", answer)
```
Question Two. 25 points. Consider the recursive function below. Experiment with the function until you understand what it does. (a) Describe in English understandable to a smart 10 year old what the function does. (b) Consider calling the function with `mystery("Champ is MSU's mascot")`. How many total times is the function mystery called?

```python
def mystery(some_string):
    if len(some_string) <= 1:
        return some_string
    else:
        first = some_string[0]
        last = some_string[len(some_string) - 1]
        return last + mystery(some_string[1:len(some_string)-1]) + first
```

Part A Answer (15 points).

Part B Answer (10 points). Explain your answer.
Question Three. 25 points. Complete the function named `alternating_colors` below for Manufactoria. When `manufactoria()` is called, it should accept any string that does not contain two consecutive colors that are the same. For example, "", "r", "b" and "brbrb" should all be accepted but "rbrr" and "bb" should not be.

```python
def manufactoria():
    test(alternating_colors, "")
    test(alternating_colors, "r")
    test(alternating_colors, "rb")
    test(alternating_colors, "brbrb")
    test(alternating_colors, "rr")
    test(alternating_colors, "bb")
    test(alternating_colors, "rbrrbrb")
    test(alternating_colors, "brbrbb")

def test(fn, string):
    if fn(string):
        result = "accepted"
    else:
        result = "not accepted"
    print('The string "' + string + '" is ' + result)

def alternating_colors(string):
```

```
Question Four.  25 points.  Google “flag of England” to see a picture of this red and white flag. Extend the `flag_of_england()` function below such that it also draws a solid red vertical line that is centered and is 50 pixels in width. (The horizontal centered red line is not needed.)

```python
import turtle

def flag_of_england(t, upperX, upperY, width, height):
    t.up()
    t.goto(upperX, upperY)
    t.down()
    t.goto(upperX + width, upperY)
    t.goto(upperX + width, upperY - height)
    t.goto(upperX, upperY - height)
    t.goto(upperX, upperY)

flag = turtle.Turtle()
flag.ht()
flag_of_england(flag, -300, 200, 600, 400)
```