Baruch College MTH 3300 JMWA Test #2

You have 90 minutes to complete this test (Part I and Part II).

READ, AND PRINT AND SIGN YOUR NAME BEFORE BEGINNING THE TEST.
I will neither give nor receive unauthorized assistance on this test.
Printed Name ____________________________ Signature ____________________________

PART I: Multiple Choice: Circle the answer to each question.

Problem 1

```
x = 5
y = -1
def f(x,y):
    x = x + 3
    y = y + 2
    return x * y
print("{0} + {1} = {2}... that can't be right.".format(y,x,f(x,y)))
```

- 5 + 8 = -1... that can't be right.
- -1 + 5 = 8... that can't be right.
- -1 + 5 = 14... that can't be right.
- -1 + 14 = 5... that can't be right.

Problem 2

```
x = [1,2,4,5]
y = x
z = y[1:3]
print("I like the number {k}".format(k=z[1]))
```

- I like the number 1
- I like the number 2
- I like the number 4
- I like the number 5

Problem 3

```
def onandon(n):
    if n == 1:
        return 0
    else:
        return n + onandon(n-1) * 2

x = 3 + onandon(3)
print(2 * x)
```

- 24
- 20
- 18
- 14
- 6
- 0

Problem 4

```
    def buggy(x):
        assert x > 2, "buggy: x is too large"
        assert x < 4, "buggy: x is too small"
        return x + 0.01
    print(buggy(3.2))
#     print(buggy(5.2))
    print(buggy(-1.3))
```

- 3.21
  AssertionError: buggy: x is too small
- 3.21
  AssertionError: buggy: x is too small
  AssertionError: buggy: x is too large
- 3.21
  AssertionError: buggy: x is too large
  AssertionError: buggy: x is too small
- 3.21
  AssertionError: buggy: x is too large

Problem 5

```
def alsobuggy(x,y):
    try:
        z = x + y
        return z
    except TypeError:
        print("alsobuggy: cannot add different types")
a = 5
b = 4.6
c = "i am a string"
d = "i am also a string WHAT ARE YOU DOING"
print(alsobuggy(a,d))
print(alsobuggy(b,a))
print(alsobuggy(c,d))
```

- alsobuggy: cannot add different types
  9.6
  i am a stringi am also a string WHAT ARE YOU DOING
- alsobuggy: cannot add different types
- TypeError: alsobuggy: cannot add different types
- alsobuggy: cannot add different types
  None
  9.6
  i am a stringi am also a string WHAT ARE YOU DOING

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PART II: Programming:

Write a program that contains the following specifications and completes the following tasks. You may use previous notes and assignments, but not consult with each other. Be sure to write an algorithm on paper before you begin coding; submit all paper used to me, and upload a zip containing a templated Python file named MTH3300_TEST2_LASTNAME_FIRSTNAME.py along with supporting modules to the assignment submission form on Blackboard for Test #2 before 2:10 PM.

1. Define a function that takes as input a two positive integers:
   - n = number of Poisson random variable samples to generate
   - x = mean (average) parameter of the random variable (use numpy.random.poisson for samples)

   and outputs a dictionary that contains how many times each positive integer was returned as a Poisson sample with parameter x.

   Assert that n is a positive integer and x is a positive float.

2. Define a function that takes as input a dictionary whose (key,value) pairs are both numbers. Return the average of the products of those pairs, i.e. for every entry in the dictionary, sum up the product key*value, and divide the sum by the length of the dictionary.

   Assert that the input is a non-empty dictionary, and raise a TypeError if any (key, value) pair are not both numbers.

   This function will return the average of the samples counted in one run of Problem 1.

3. Estimate the mean of a Poisson random variable via Monte Carlo simulation:

   Generate a dictionary of sample counts from Problem 1 M times, each time computing its average with Problem 2. Store these averages in a list. When complete, average this list. Return the result.

4. Get the error percentage between the result of Problem 3 and the"true" mean x.

Supply me with the output of your program, using the inputs

- $n = 5000$ samples per run
- $x = 3.64$ is the mean of a Poisson random variable
- $M = 1000$ simulation runs