NAME: _____ RPI ID _____

CS1010 Introduction to Computer Programming Spring 2019 Exam 2

Please read the following pledge, then sign and print your name on the spaces provided, certifying the statement:
On my honor as a Rensselaer Polytechnic Institute student, I have abided by academic integrity standards on this exam, which means that I will not give or take answers from anyone.

_____

Your Signature and Date

_____

Your PRINTED name

Rules: There are ***6 questions*** in all to be completed in ***1 hour 50 minutes***.

1. Work entirely alone. Do not give or solicit assistance from any other student. Academic dishonesty will not be tolerated.
2. Sit in your assigned seat.
3. Turn off cell phones and smart phones.
4. The exam allows use of hand written notes (2 pages A4 size) for reference.
5. Feel free to use the restrooms as necessary. Just leave all your materials at your seat.
6. If you have a question, bring it down to the front so as to minimize disruption.

Question 1_____

Question 2_____

Question 3_____

Question 4_____

Question 5_____

Question 6_____

Total (From 100 points): _____

Question 1. What is the output of the following code. There is no error in this code. **(25 points: 5 points each)**

Code	Output

Number = 6
for row in range(1, Number):
for column in range(1, row + 1):
print(column, end=' ')
print("")
	1
	1 2
	1 2 3
	1 2 3 4
	1 2 3 4 5

n=25
for i in range(n):
if i%2==0:
print(i, end=" ")
	0 2 4 6 8 10 12 14 16 18 20 22 24

rows=6 for i in range (0, rows): for j in range(0, i + 1): print("*", end=' ') print("\n")	* *

rows = 4
for i in range (0, rows):
for j in range(0, i + 1):
print("*", end=' ')
print("\n")
for i in range (rows, 0, -1):
for j in range(0, i -1):
print("*", end=' ')
print("\n")
	*
	* *
	* * *
	* * * *
	* * *
	* *
	*

L = [1,2,3]
i = 0
while i < len(L):
  j = 0
  while j < len(L):
  print(L[i], L[j])
  j += 1
  i += 1
	1 1
	1 2
	1 3
	2 1
	2 2
	2 3
	3 1
	3 2
	3 3

Question 2. Calculate the average of numbers of a list with 5 integer elements using a loop. You should not use the built-in functions for sum and average. (**10 Points**).

Solution:

```
l=[10,2,3,4,5]
a=0
for i in range(0,len(l)):
   a=a+l[i]
print('Average =', a/len(l))
```

Question 3. Explain what each line of code does in not more than 1 line. (**10 points: 2 points each**)

a. Newval = ( )
   Creates an empty tuple.

b. im = Image.open(filename)
   im.show()
   Opens and displays image.

c. im = Image.open(filename)
   im.size
   Opens and displays pixel size of an image.

d. im.convert('L')
   Converts an image to grayscale.

e. Newobj=[ ]
   Creates an empty list.

Question 4. What is wrong with the following code. Assume each of the following is a separate program. Find the first error in the code that prevents it from generating output. If there is an error describe it in the solutions box on the right. If there is no error simply write NO ERROR. (**20 points: 5 points each**)

Code	Solution
def big_diff(nums): a=max(nums) b=min(nums) return a-b	Wrong Indentation.

while (count < 5):
  print("Hello World")
  count = count + 1
	Counter not initialized

def row_col(x,y):
  a=x[0][0]+y[0][0]
  b=x[0][1]+y[1][0]
  c=x[0][2]+y[2][0]
  return [a,b,c]
	NO ERROR

l1=[1,5,-1,-3] l2=[2,6,-7,0] for i in range(len(l1)): l2[i]=l1[i+1]	List index out of range

Question 5.

List Operations: Given a List,
Fruits = ['orange', 'apple', 'pear', 'banana', 'kiwi', 'apple', 'banana']
Write a single line of code to accomplish the following: (**10 points: 2 points each**)

Question	Solution/code
Reverse the order of the list i.e. Fruits= ['banana', 'apple', 'kiwi', 'banana', 'pear', 'apple', 'orange']	Fruits.reverse()
Add another fruit called ‘grapes’ to the list.	Fruits.append('grapes')
Arrange the list in alphabetical order i.e. ['apple', 'apple', 'banana', 'banana', 'grapes', 'kiwi', 'orange', 'pear']	Fruits.sort()
Output the last element ‘pear’ from the list.	Fruits.pop()
Remove one ‘apple’ from the list	Fruits.remove(‘apple’)

Question 6

a. Write a function that computes the factorial of all numbers in a given list. Output a list with the solutions. (**10 points)**

Test cases:

list_fact([2,3,4,5,8]) → [2, 6, 24, 120, 40320]

list_fact([2,5,1]) → [2, 120, 1]

Solution:

```
def fact(x):
    if x == 0:
        return 1
    return x * fact(x - 1)

def list_fact(y):
    final=[]
    for i in range(len(y)):
      final.append(fact(y[i]))
    print(final)
```

b. Given a list/array of integers, write a program that outputs a new list/array with the number raised to power its index. For example if input = [1,2,3,4] then output will be [1,2,9,64] because the index of 1 is zero, index of 2 is 1, index of 3 is 2 and so on. (**10 points)**

Solution:

```
def square_num(x):
    final=[]
    for i in range(0,len(x)):
        final.append((x[i])**i)
    print(final)
```

c. Find all odd numbers in a list. For example, in the list [1,2,4,9,6] output [1,9]. (**5 points**)

```
def odd_num(x):
    l1=[]
    for i in range(len(x)):
        if x[i]%2==0:
            continue
        l1.append(x[i])
    print(l1)
```