NAME: _____ RPI ID _____

CS1010 Introduction to Computer Programming Spring 2019 Final Exam

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 ***10 questions*** in all to be completed in ***3 hours***.

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 notes (3 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.

Total (From 100 points): _____

Question 1. Choose the correct answer (out of the four options). Circle the option that you select. **(20 points – 2 points each)**:

a. What part is called the brain of the computer:
   i. Random Access Memory (RAM)
   ii. Central Processing Unit (CPU)
   iii. Software
   iv. Hardware

b. The error encountered when dividing a finite number by zero:
   i. Index Error
   ii. Zero Division Error
   iii. Type Error
   iv. Invalid Syntax

c. Which step is NOT included in structured programming:
   i. Problem divided into smaller sub-problems
   ii. Each sub-problem is analyzed
   iii. A complex problem is solved as a whole/single problem
   iv. A solution for a sub-problem is obtained

d. Which list comprehension returns odd numbers in the range 0 to 8:
   i. [x for x in range(8) if x % 2 != 0]
   ii. [x for x in range(8) if x % 2 == 0]
   iii. [x**3 for x in range(0,8)]
   iv. [x**2 for x in range(8)]

e. Which of the following does not create a Python Set:
   i. {1+2, 3, "a"}
   ii. {3, 3, "a"}
   iii. set([1,2,2,2,2,3])
   iv. { }

f. Profiling a Program means:
   i. Measuring the time and memory a program uses

ii. Finding characteristics of a program

iii. Categorizing a program

iv. Not executing a program

g. If x=3, y= 5 then x==y returns:

i. True

ii. None

iii. False

iv. Error

h. What is the name of the object that represents ordered sequence of characters:?

i. Sets

ii. Strings

iii. Dictionary

iv. Tuples

i. If s = 'House', then s[-1] will return:

i. H

ii. O

iii. S

iv. E

j. Which one of the following is a built-in function in Python:

i. print()

ii. function()

iii. Module

iv. typecast

Question 2. Explain what each line/lines of code does. **(10 points: 1 point each)**

Code	**Output**
test = {}	
d = d1.copy()	
s = 'Hello World' s[len(s)-1]	
test_list=[1.6,2.5,3.8,4.1] sum(test_list)	
ls1 = [5,1,2,4,3] ls1.append('add me to list')	
{2,1,3}	
{1,2,3} | {2,3,4}	
people.intersection(vampires)	
s={1,2,3,4,5} s.pop()	
tup1=('a','b','a') tup1.count('a')	

Question 3. In the following table there is some code given and a statement (in bold) follows the code. **For the statement**, answer each part in True or False: (**10 points: 2 points each**)

Code	**Answer**

def max_of_two(x, y):
  if x > y:
  return x
  return y
max_of_two (12,14)
 	
The code/function above returns 12.	

z=open('test.txt','r') data = z.read() z.close() **The code above reads a text file and saves the contents in a variable called 'data'.**	
def isright(a,b,c): return (a^2+b^2 ==c^2) isright(2,3,4) **The code/function above returns True**	

def common_end(a, b):
 if len(a)>0 and len(b)>0:
  if a[0]==b[0] or a[-1]==b[-1]:
  return True
  return False
 return False
 	
common_end([1, 2, 3], [7, 3])
 	
The code/function above returns False	

def sublist(l1,l2):
  if l2[0] in l1:
  return True
  return False
 	
sublist([1,2,3,4,5],[2,3])
 	
The code/function above returns True	

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. (**15 points: 3 points each**)

Code	Solution

def max_end3(nums):
  newlist=[nums[0],nums[-1]]
  newelement=max(newlist)
  l=[newelement]*len(nums)
  return l	

a = [1, 2, 3] print ("Element = %d" %(a[3]))	
my_dict = {'data1':100,'data2':-54,'data3':247} result=1 for key,value in my_dict: result=result * my_dict[key] print(result)	
s1=input("Enter first string:") s2=input("Enter second string:") a=list(set(s1)|set(s2)) print("The letters are: ",a)	
E= {1,2,3,9,10,11,12} F= {4,5,6,8,9,10,11,12,13} len(E||F)	

Question 5.
Dictionary Operations:
Write a **single line (or at most 2 lines)** of code to accomplish the task stated in Bold: (**10 points: 2 points each**)

Question	Solution/code
my_dict = {'key1':30,'key2':[12,23,33],'key3':['val1','val2','val3']} **Print/output 'val3'**	
Dict = { 1 : 'Welcome', 2 : 'To', 3 : 'NY', 'X' : {4 : 'NY', 5 : 'Is', 6 : 'Great'}, 'Y' : {7 : 'Empire', 8 : 'State'}} **Remove the key (=1) that has value 'Welcome'**	
m1 = {'a': 10, 'b': 20} m2 = {'x': 30, 'y': 20} **Concatenate the above two dictionaries.**	
dictionary={'one':5, 'two':1, 'three':6, 'four':10} **Remove all elements of the dictionary given.**	
Bag={ } **Add a key called money with value 100 to Bag.**	

Question 6

Write a Python Program to find the index of the two largest integers in a given list L. Write your algorithm using pseudo-code or flowchart first (3 points) and then write the code (2 points). (**5 points)**

L= [80,84,47,48,37,12,96,10,32,46]

Question 7: Select the output of each code from the options given. Circle the option that you select. (**10 points: 2 points each**)

No.	Question/Code	Options/Answer

1	def f(value, values):
	  v = 1
	  values[0] = 44
	
	t = 3
	v = [1, 2, 3]
	f(t, v)
	print(t, v[0])
		A. 1 44
		B. 3 1
		C. 3 44
		D. 1 1

2	def f(i, values = []):
	  values.append(i)
	  print (values)
	  return values
	f(1)
	f(2)
	f(3)
		A. [1] [2] [3]
		B. [1, 2, 3]
		C. [1] [1, 2] [1, 2, 3]
		D. 1 2 3

3	dict = {'c': 97, 'a': 96, 'b': 98} for x in sorted(dict): print (dict[x])	**A.** 96 98 97 **B.** 96 97 98 **C.** 98 97 96 **D.** 98 98 98
4	box = {} jars = {} crates = {} box['biscuit'] = 1 box['cake'] = 3 jars['jam'] = 4 crates['box'] = box crates['jars'] = jars print (len(crates[box]))	**A.** 1 **B.** 3 **C.** 4 **D.** Type Error
5	my_dict = {} my_dict[(1,2,4)] = 8 my_dict[(4,2,1)] = 10 my_dict[(1,2)] = 12 sum = 0 for k in my_dict: sum += my_dict[k] print (sum) print(my_dict)	**A.** 70 **B.** 30 {(1, 2): 12, (4, 2, 1): 10, (1, 2, 4): 8} **C.** 47 {(1, 2): 12, (4, 2, 1): 10, (1, 2, 4): 8} **D.** 30 {[1, 2]: 12, [4, 2, 1]: 10, [1, 2, 4]: 8}

Question 8: There is a function given and the function is called using some arguments. What is the output after running the entire code? Circle the option that you select. (**10 points : 2 points each**)

No.	Code	Result

1	def ends(str):
	  if len(str) < 2:
	  return ' '
	  return str[0:2] + str[-2:]
	
	print(ends('w3resource'))
		1. w3ce
		2. wc
		3. w3e
		4. wrso

2	def chars_mix_up(a, b):
	  new_a = b[:2] + a[2:]
	  new_b = a[:2] + b[2:]
	
	  return new_a + ' ' + new_b
	print(chars_mix_up('abc', 'xyz'))
		1. xyz abc
		2. xyc abz
		3. abc xyz
		4. axb cyz

3	L = [(), (), ('',), ('a', 'b'), ('a', 'b', 'c'), ('d')] L = [t for t in L if t] print(L)	1. [(), (), ('',), ('a', 'b'), ('a', 'b', 'c'), ('d')] 2. [(), (), ('',), ('a', 'b'), ('a', 'b', 'c')] 3. [('a', 'b'), ('a', 'b', 'c'), ('d')] 4. [('',), ('a', 'b'), ('a', 'b', 'c'), ('d')]

4	fruit = {}
	
	def addone(index):
	  if index in fruit:
	  fruit[index] += 1
	  else:
	  fruit[index] = 1
	
	addone('Apple')
	addone('Banana')
	addone('apple')
	print (len(fruit))
		1. 1
		2. 3
		3. 2
		4. 4

5	def new():
	  arr = {}
	  arr[1] = 1
	  arr['1'] = 2
	  arr[1] += 1
	  sum = 0
	  for k in arr:
	  sum += arr[k]
	  return (sum)
	new()
		1. 1
		2. 2
		3. 3
		4. 4

Question 9: What will be the output of the following code. Write your answer in the box provided on the right. (**5 points – 1 point each**)

Code	Solution
S={1,2,3} S.intersection_update({5,6,7,8,9}) S	
{1,2,3,5} | {2,3,4,5,6}	
a={0,1,2,3} b={0,2,3,4} a & b	
{-1,-2,1,2,3,5} ^ {-1,-2,-3,2,3,4,5,6}	
Y={1,2,3} Y.add(4) Y	

Question 10: Write the Output of each program given, in either 'True' or 'False'. (**5 points – 1 point each**).

Code	Solution
x=True y=True x and False == False	
x=True y=False x or False == x	
not x == x	
init_tuple_a = 'a', 'b' init_tuple_b = ('a', 'b') print (init_tuple_a == init_tuple_b)	
a = {'a':1,'b':2,'c':3} b = {'b':2,'a':1,'c':3} a!=b	