

NAME: _____ RPI ID _____

CS1010 Introduction to Computer Programming Fall 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 **5 questions** in all to be completed in **1 hour 30 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)**

No.	Code	Output
1	<pre>v = [-50, 7, 20, -44, -3, 0, 6, 12] for i in v: if i == -3: print(i * i * i) elif i < 0: continue elif i == -3: print(i * i * i) elif i == 0: break else: print(i + i)</pre>	
2	<pre>n=10 for i in range(n): if i%2==0: continue print(i, end=" ")</pre>	
3	<pre>for row in range(0,5): for column in range(0,5): if (column == 3) or row==(2): print("@", end=' ') else: print("*", end=' ') print()</pre>	
4	<pre>#first term in print statement is multiplied by one #tab space i = 1 while i < 10: print((4 - i//2)*" " + i**i) i+= 2</pre>	
5	<pre>v=["pear", 7, [2, 1, 7], 6] a = v[2] b = v[1::] a[1] = "cake" a.pop() b[0] = "cupcakes" print(b)</pre>	

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Question 1. [20 points: 10 points each]

Given a list of temperatures at 4 different sites on earth :

```
temps_at_sites = [ [ 12.12, 13.25, 11.17, 10.4],  
                   [ 22.1, 29.3, 25.3, 20.2, 26.4, 24.3 ],  
                   [ 18.3, 17.9, 24.3, 27.2, 21.7, 22.2 ],  
                   [ 12.4, 12.5, 12.14, 14.4, 15.2 ] ]
```

- a) Write code to find the average temperature at each site and output a list that contains the average temperature for each site. Each value must be rounded to 2 decimal places.

- b) Write code to output the site that has the maximum average temperature. Sites can be called site 1, site 2, site 3 and site 4 (in that order in the given list). You may use the code from the previous part. If site 2 has the maximum temperature, then the output should be printed like this:

Maximum temperature is at site 2.

If site 4 has the maximum temperature, then the output should be printed like this:

Maximum temperature is at site 4.

Question 3. Explain what each line of code does (Answer must not exceed 1 line). **(10 points: 2 points each)**

a. `from PIL import Image`

b. `im = Image.open(filename)`
`im.format`

c. `im = Image.open(filename)`
`im.mode`

d. `im.crop((w1,h1,w2,h2))`

e. `im3 = im.resize((300,200))`

Question 4. List Operations: (20 points: 4 points each)

Given two lists (Students and New) each with student related information as shown:

```
Students= [['Daniel',3.51,  
['MATH','STAT','PHYS'],'NY'],['Ryan',3.18,['MATH','STAT','CSCI'],'PA']]  
New=['Sean',3.77,['CSCI','MATH','CALC'],'DE']
```

To answer the following questions, write code in the 'Code' column on the right. Your code can be one or more lines (There is NO restriction to the number of lines of code).

	Questions	Code
1	Modify the Students list such that all information in 'New' is also included in 'Students' and we get the following output when we print(Students): [['Daniel', 3.51, ['MATH', 'STAT', 'PHYS'], 'NY'], ['Ryan', 3.18, ['MATH', 'STAT', 'CSCI'], 'PA'], ['Sean', 3.77, ['CSCI', 'MATH', 'CALC'], 'DE']]	
2	Update Students List (This is the new list after the update in part 1) such that 'Ryan' has the course 'DATA' instead of 'STAT'	
3	You are given another list: zip_new=[12180,19104,19716] Each has a zip code for the students in the Students list. Order of both the lists match i.e. zip 12180 is for Daniel and so on. Write code to add this zip to each students' info. Required output: [['Daniel', 3.51, ['MATH', 'STAT', 'PHYS'], 'NY', 12180], ['Ryan', 3.18, ['MATH', 'DATA', 'CSCI'], 'PA', 19104], ['Sean', 3.77, ['CSCI', 'MATH', 'CALC'], 'DE', 19716]]	

4	<p>Print the following from the updated list:</p> <p>Daniel has GPA = 3.51</p> <p>Ryan has GPA = 3.18</p> <p>Sean has GPA = 3.77</p>	
5	<p>Consider a user provided input which is saved in a variable called name as shown:</p> <p>name=input('Enter the name of the student').strip()</p> <p>Assuming that the user inputs one of the valid names in the Students' list (from part 3 above). Write code to output the following (assuming Daniel was the name entered by user):</p> <p>Daniel is taking the following courses:</p> <p>['MATH', 'STAT', 'PHYS']</p> <p>OR if Ryan was entered by the user, output will be:</p> <p>Ryan is taking the following courses:</p> <p>['MATH', 'DATA', 'CSCI']</p>	

Question 5 (25 points)

- a. Write a function called **has_22(word)**. This function should take a string as an input and return a True if the word contains two consecutive pairs of double letters and False otherwise. **(13 points)**

Test Cases:

print(has_22('faahcnff')) : False

print(has_22('aaggx')): True

print(has_22('vvett')) : False

print(has_22('zaddnnhfnt')): True

- b. This problem is divided into two parts (part 1 and part 2). We deal with Prime numbers in this problem (Prime numbers are only divisible by 1 and themselves) **(12 points)**

Part 1: In this part write a function called **Prime(num)** that takes an integer as input and returns a True if the number is a prime number and returns a False if it is not. **(6 points)**

Test cases:

print(Prime(8)): False

print(Prime(7)): True

print(Prime(31)): True

Part 2: You are given a list of integers called **NUM=[3,2,6,8,21,29]**. Write code to output a new list with only Boolean values (True or False) based on whether the number in NUM is a Prime or not. For example in this case the output must be: **[True, True, False, False, False, True]**. You must call your function from Part 1 to complete this part. **(6 points)**