Introduction to Computer Science (ICS 3U)
Repetitive Structure Problems

Save the following programs in a folder called **Repetitive Structures** .

1. a) Write a program which will ask the user to input their name and the city they live in. The program will then output this information. The program should allow 5 different people to input their information and have it outputted. Call your program **Repetitive1a.py**

1. b) Write a program which will ask the user to input their name and the city they live in. The program will then output this information. The program should continue to run until the user no longer wishes to input their information. Call your program **Repetitive1b.py**

2. Write a program which will ask the user to input their name the city they live in **once**. The program will then output this information **6** times. Call your program **Repetitive2.py** (**Hint**: This program is very similar to **Repetitive1a.py**)

3. Create a program that will allow the user to input any name and the number of times they want the name to be outputted. The program will then output the name the appropriate number of times. Save your program as **Repetitive3.py**

4. a) Write a program which will output all the numbers between 0 and 20. Call your program **Repetitive4a.py**. (**Hint**: Output the counter variable!)

   b) Write a program which will output every second number between 0 and 20. Call your program **Repetitive4b.py**. (**Hint**: Add a 3rd parameter (number) to your range function which is the amount you want to "jump".)

   c) Write a program which will output all the numbers between 0 and 20 in reverse order. Call your program **Repetitive4c.py**. (**Hint**: Enclose the ***range*** function with the ***reversed*** function).

5. Write a program which will output the numbers between 1 and 20**.** Beside each of the numbers, the square and the square root of the number should be outputted. The output should look like the following:

   The square of 4 is 16 and the square root of 4 is 2 .

   Hint 1: Use the counter variable like you did in 4(a). Since it is a variable, it can be used in calculations. For example, a possible line of code in the loop could be:

   product = 10 * *i*

   Hint 2: There are two ways to find the square root of a number:
   1) The exponent is of a square root is .5 (ex. **print** (16**.5) will output 4)
   2) Use the **math.sqrt** () function. This function in from the math library of functions. We will discuss libraries later but basically, a library contains a collection of specialized functions which are not part of the basic Python language. The functions in the math library can be used by adding the following command at the beginning of your program: ***import*** *math*

   Call your program **Repetitive5.py**

6. a) Write a program which will ask the user to input the how much money each student brought in for the "Share Lent Campaign" for a small class of 6 students. The program will calculate and output the total number of cans for the class using a loop. Call your program **Repetitive6.py**

   Hint 1: Make sure you watch the videos **Using a Loop to Add Numbers** and **Using a Loop to Add Numbers - How It Works** before attempting this program.

   Hint 2: Create a single variable for the amount of money and another variable called total. Each time through the loop, have the user input the amount of money a student brought in and then add it to the total.

   b) Improve your program so that the average amount of money per student is also calculated and outputted. Use the final value in total to calculate the average. Re-save your program **Repetitive6.py**

7. Write a program that will add up all the numbers between 1 and 500 and output the only the sum. Call your program **Repetitive7.py**

   Hint: Create a variable called total and add the counter value to total each time through the loop.

8. Write a program that will ask the user how many integers they wish to add up. The program will then prompt the user to input integers, one at a time. When all the integers have been inputted, the sum and average of the integers will be outputted. Call your program **Repetitive8.py**

9. a) Write a program which will output the numbers between 0 and 15**.** Beside each of the numbers, the square and the cube of the number should be outputted. The output should be in a chart like below:

Number	Square	Cube
0	0	0
1	1	1
2	4	8

   Call your program **Repetitive9.py**

   Hint 1: Make sure you watch the video **Formatting Output** before attempting this program.

   Hint 2: To create a table, you will have to convert the each value outputted to a string using the **str ()** function and then the the **.ljust** () function to position it. Use them with the print () function.

   b) Add the power of 5 and the power of 10 to your chart. You may have to adjust your previous chart to make it fit. Re-save your program **Repetitive9.py**

10. A person can make a great deal by putting an amount of money in the bank and leaving it there to collect interest for a long period of time. Banks calculate your interest by compounding it which means that each year you not only get interest on your initial balance (called principle), but on any interest you have earned to that point (ie. interest on your interest). For example, if you deposit an initial balance is $200 in the bank and receive 10% interest, after 4 years, you will have $292.82 as shown on the chart below:

Year	Interest	Balance
0	-	200.00
1	20.00	220.00
2	22.00	242.00
3	24.20	266.20
4	26.62	292.82

The amount of interest earned for the year is simply the previous years balance * 10%.

a) Create a program that will allow the user to input any amount of principle. It should produce a chart like the one on this page showing the results over 4 years at 10% interest. Call your program **Repetitive10.py**

b) Modify your program so that it allows the user to input the principle and the interest rate. Re-save your program as **Repetitive10.py**

c) Modify your program so that it allows the user to input the principle, the interest rate and the number of years they wish to leave their money in the bank. Re-save your program **Repetitive10.py**

11. The employees at the Acme Ltd. work 35 hours a week. A new employee earns $15 an hour and receives a $5.00 an hour raise after every year of service. Create a program which will output a table showing the weekly salaries of workers for the first 7 years of service. The column headings should look like the following:

Number of Years of Service	Hourly Rate	Weekly Salary	Monthly Salary	Annual Salary

Assume 4 weeks in a month and 52 weeks a year. Call your program **Repetitive11.py**

12. a) Create a program that will output a multiplication table from 1 to 13. Your program should be in the following form (don't worry about the lines to start):

	1	2	3	4	..	11	12	13
1	1	2	3	4		11	12	13
2	2	4	6	8		22	24	26
3	3	6	9	12		33	36	39
:								
11	11	22	33	44		121	132	143
12	12	24	36	48		132	144	156
13	13	26	39	52		143	156	169

Save your program as **Repetitive12.py**

b) Add the lines to your chart. You may have to do some research to draw the vertical lines.