Assignment 2 – Due Friday Feb. 26th, 2021 at 12:00 am

Each program must start with a multi-line comment as shown below. For Assignment 1 question 2 replace x with 1 and y with 2. Replace each occurrence of DentStew and Stew Dent with your name. Replace yyyy/mm/dd with the date you completed the program.

```
# DentStewAxQy.py
#
# Course:      COMP 1012
# Instructor:  Ramin Soltanzadeh
# Assignment:  x Question y
# Author:      Stew Dent
# Version:     yyyy/mm/dd
#
# Purpose:     The purpose of the program.
#
# var1 - the use / meaning of each variable in the program
```

Begin each program with the following statements.

```
from time import ctime

print('\n-----------------------------------------\n')
```

End each program with the following statements.

```
Print("""
Programmed by Stew Dent
Date: %s
End of processing.""" % ctime())
```

Replace Stew Dent with your real name.

The name of each program should be of the form:
    LastnameFirstnameAnQm
If your name is Stew Dent and the program is for assignment 1 question 1 then the name of the program should be:
    DentStewA2Q1
The corresponding python file would be named:
    DentStewA2Q1.py

Upload your solution on Moodle. Write all your answers in one *.py file and separate them with appropriate comments. Do **NOT** use zip, rar or any other packaging of your files!

Question 1

The purpose of this question is to write a program that grabs a list, recognizes and removes the duplicated items. To answer this question, write a function that first ask the user to enter the length of an optional list. Then, grabs the elements of the list one by one.

```
def grabList():
```

Afterwards, then write another function that search inside that list element by element and find the duplicated items.

```
def listSearch():
```

In this function if an element is occurred more than one time, it should be recognized by the program and increase its frequency of occurrence. In order to remove the duplicated items, write another function:

```
def delDup():
```

This function will search in the frequency of occurrence of each element and delete the ones that their frequency of occurrence is more than one.

All these functions can be called either in a *main ()* function or in a main code body.
Note : The code should be able to mention which element(s) was duplicated and remove from the final list.

```
------------------------------------------------------------
Enter the length of the list: 4

Enter element 1: 12

Enter element 2:2.4

Enter element 3: a

Enter element 4: 2.4

The final list is: [12,a]

The element 12 occurs 1 time at 0.

The element 2.4 occurs 2 times at 1,3 => it is removed

The element a occurs 1 time at 2.


Programmed by Stew Dent.
Date: Tue Feb 2 08:15:22 2021
End of processing.
```

Test your program using different lists with different lengths and elements

Question 2

The purpose of this question is writing a code that can calculate the standard deviation of a list of numbers that user enters. For this purpose, you may use (or rewrite) the grabList() function that you wrote for Question 1. Then you need another function that can calculate the average of the entered elements. The input of that function would be the list that the user entered in the first step.

```
def avg_calc(ls):
```

The function *avg_calc* should be called inside another function where the standard deviation is calculated. This function is:

```
def sd_calc(ave_cal,ls):
```

In *sd_calc*, the differences between each entered data in the primary list and the mean that is calculated in the *avg_calc* are powered by two and added together. After adding the power two of all the difference between each list element and the average of the list, then calculate the square root of the result to find the standard deviation of the list elements. The example below shows how the standard deviation is calculated:

1) We have list of numbers (this part is done in the *grabList* function):

$$2,\ 4,\ 4,\ 4,\ 5,\ 5,\ 7,\ 9$$

2) Calculate the mean of the list (this part is done in *ave_calc* function):

$$\mu = \frac{2+4+4+4+5+5+7+9}{8} = 5$$

3) Find the difference between each element and the average: (this part is done in the *sd_calc* function) :

$$(2-5)^2 = (-3)^2 = 9 \qquad (5-5)^2 = 0^2 = 0$$
$$(4-5)^2 = (-1)^2 = 1 \qquad (5-5)^2 = 0^2 = 0$$
$$(4-5)^2 = (-1)^2 = 1 \qquad (7-5)^2 = 2^2 = 4$$
$$(4-5)^2 = (-1)^2 = 1 \qquad (9-5)^2 = 4^2 = 16$$

4) Add the difference that you calculated in item 3 (this part is done in the *sd_calc* function) :

$$\sigma^2 = \frac{9+1+1+1+0+0+4+16}{8} = 4$$

5) Find the square root of the result of item 4 and print it (this part is done in the *sd_calc* function) :

$$\sigma = \sqrt{4} = 2$$

```
------------------------------------------------------------
Enter the length of the list: 5

Enter element 1: 4

Enter element 2: 2

Enter element 3: 5

Enter element 4: 8

Enter element 5: 6

Sample Data:  [4, 2, 5, 8, 6]
Standard Deviation:  2.23606797749979


Programmed by Stew Dent.
Date: Tue Feb 2 09:15:22 2021
End of processing.
```

Test your program using different lists with different lengths and elements.

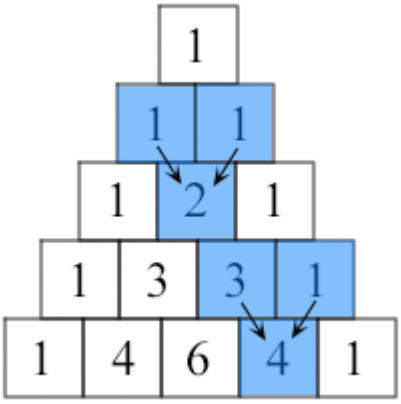
Note: Make sure that your code is working for any input and not only the examples that are already explained in the question.

Question 3

Write a function that can return the first row of Pascal's triangle. Pascal's triangle is an arithmetic and geometric figure first imagined by Blaise Pascal. Your function can be:

```
def PasTri(n):
```

where "n" is the number of row that we want to have in the output. Figure below shows the structure of a Pascal's triangle.



As you can see in the image, each number is the two numbers above it added together except the numbers in on the edge of the triangle where all of them are one.
Note: To answer this question, you have to use **zip** function.
Your function will get the n from input and print the numbers till the row number "n" as it is shown below:

```
------------------------------------------------------------
PasTri(6)

[1]
[1, 1]
[1, 2, 1]
[1, 3, 3, 1]
[1, 4, 6, 4, 1]
[1, 5, 10, 10, 5, 1]

Programmed by Stew Dent.
Date: Tue Feb 2 17:15:22 2021
End of processing.
```

Test your program using different lists with different lengths and elements