**PROGRAMMING FOR ALL – SPRING 2021 - WEEK #5 – 210426 & 210428**

**210426 – TEST #1 - 30 min**

**Topics for the week - Chapter 4:**

- Repetition Structures – continues
- The `while` loop introduction - read 4.2
- Sentinels - read 4.5
- Input validation – read 4.6
- Nested loops - read 4.7

**Class Exercises:**

The `while` loop

- **Sum of first n positive integers with repetition (yes/no for more)**

Write a program that prompts a user to enter a positive integer n. The program should display the sum 1+2+3+4+…+n.

The user can enter the value n repeatedly. The program also displays the number of entered n values.

- **List of squares**

Write a program that prompts the user to enter an integer and displays all the squares of integer numbers where the square is less than or equal to the entered integer, in ascending order.

**Example:**

If the entered integer is 39, program displays 0, 1, 4, 9, 16, 25, 36

- **Budget Analysis**

Write a program that asks a user to enter an amount of his/her monthly budget. A loop should then prompt the user to enter each of his/her expense for the month and keep a running total for the expenses.

At the end, the program should display the amount that the user is over or under budget. If the user is over budget a warning should be displayed (use a flag variable to activate the warning.)

## The `while` loop with a SENTINEL

- **Sum of first n positive integers with repetition & sentinel**

Write a program with a loop that asks the user to enter a positive integer n. The program should display the sum 1+2+3+4+…+n.

The user can enter the n repeatedly; to end the program the user enters value 0 or a negative integer. The program also displays the number of entered n values.

- **First name**

Write a program that asks a user to enter a name of a person and then displays the first name of the person.

Example:

If the user enters Peter Horak the program displays Peter.

- **First name with repetition**

Update the previous program such way that the user can enter multiple names. If the user enters for the name symbol "@", the program ends.

```
This program displays the first name of a person.
To end the program enter for the name symbol @.

Enter the name of the person: Ingrid Horakova
The first name of the person is Ingrid

Enter the next name of the person: Elizabeth Tylor
The first name of the person is Elizabeth

Enter the next name of the person: Jane Doe
The first name of the person is Jane

Enter the next name of the person: @
Thank you for using my program.
>>>
```

- **List of squares – update with the repetition and a sentinel**

  List of squares with one input of n:

  Write a program that prompts the user to enter an integer and displays all the squares of integer numbers where the square is less than or equal to the entered integer, in ascending order.

  **Example:**

  If the entered integer is 39, program displays 0, 1, 4, 9, 16, 25, 36

Update the program such way that the user can enter multiple integers for the value n. By entering a negative integer the user ends the program.

Moreover, for each entered integer the program displays the number of squares displayed.

At the end the program displays the number of square sequences displayed.

Example:

```
This program displays all squares not larger than entered integer.
To end the program enter for the integer a negative integer.
Enter an integer: 15
These are squares not exceeding value 15 :
0 1 4 9
There are  4 squares displayed.

Enter the next integer: 566
These are squares not exceeding value 566 :
0 1 4 9 16 25 36 49 64 81 100 121 144 169 196 225 256 289 324 361 400 441 484 529
There are  24 squares displayed.

Enter the next integer: 78
These are squares not exceeding value 78 :
0 1 4 9 16 25 36 49 64
There are  9 squares displayed.

Enter the next integer: -5

The program displayed 3 square sequences.
>>>
```

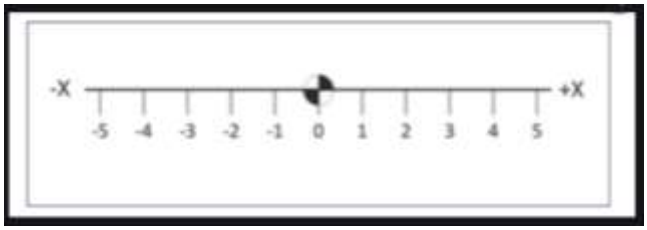
- **Moving along with sentinel**

Let suppose that an object is moving along the axis x and it starts in the position x=0. The individual moves are given by a user such way that a positive number shifts the object the appropriate number of units to the right and a negative number shifts the object the appropriate number of units to the left.

Write a program with a loop that prompts a user to enter a series of numbers representing individual shifts (as many as the user wishes). After entering all inputs by the user, the program should display following information:

- Number of shifts to the right made by the object;
- Number of shifts to the left made by the object;
- The final position of the object.

The program ends when the user enters 0 for the shift.




**Example:**

```
By entering numbers you can move an object along the axis x.
The starting position of the object is at zero.
If you enter a positive number, the object shifts to the right.
If you enter a negative number, the object shifts to the left.
By entering 0 you end the shifting.

Enter the move of the object: 12.3
Enter the next move: 1.2
Enter the next move: -5.3
Enter the next move: 14.3
Enter the next move: -2.5
Enter the next move: 0

You made  3  moves to the right;
You made  2  moves to the left;
The final position of the object is x= 20.0 .
>>>
```

- **Morning jog - practice**

The user of this program is a future athlete and he/she just started his/her practice for an upcoming event. On the first day, the user can run some number of miles, and by the event he/she must be able to run the number of miles given by the organizers of the event.

Write a program that prompts the user to enter his/her running skills at the start of the practice and the goal of the practice.

Then the program displays the number of days required for the user to finally reach the required distance for the event, if the user increases the running distance each day by 10% from the previous day.

The program also displays a table with the daily progress.

If the starting skills of the user are higher than the goal skill, the program displays "You are ready!"

```
This program displays the number of day needed for the practice.

How many miles you can run now? 5
How many miles you need to run during the event? 25

The following table displays how your running skills are improving:

DAY OF PRACTICE         YOUR RUNNING SKILLS
          1                       5.50
          2                       6.05
          3                       6.66
          4                       7.32
          5                       8.05
          6                       8.86
          7                       9.74
          8                       10.72
          9                       11.79
          10                      12.97
          11                      14.27
          12                      15.69
          13                      17.26
          14                      18.99
          15                      20.89
          16                      22.97
          17                      25.27

To reach the goal you need  17 days to practice.
>>>
```