PROGRAMMING FOR ALL – SPRING 2021 - WEEK #10 – LAB – 210602

GENERAL LAB RULES:

1. **Every student has to join lab sessions.**
2. A goal of lab assignments is to practice topics covered in class during each week. Each lab has two parts: Theory & Programming.
3. In the theory part, you are expected to read pieces of codes and to predict outputs of these codes. You should not use Python for these predictions; you should test your skills to understand codes. When everyone is ready, TA displays correct outputs.
4. In the programming part, you are expected to make programs for assigned problems. You are expected to make all programs during the lab time, however, only one specified program should be submitted to CANVAS.
5. TA has to check your lab work for the full lab credit.

TOPICS:

Review

It is in your best interest to work on assigned programs. This week no program is expected to be submitted to the CANVAS.

PROGRAMMING

Note: In all programs you can use only methods and tools already introduced in the class.

PROGRAM #1: CHANGE OF RANDOM INTEGERS

STEP 1:

Write following three functions:

- A value returning function `work_list` which generates and returns a list of 12 random integers from 1000 to 9999.

- A value returning function `symbols` with a parameter representing a list of integers which returns a list of symbols representing integers. Symbols are assigned following way:
  - If the last digit of the integer is 7 or 9, the assigned symbol is "$";
  - If the last digit of the integer is even, the assigned symbol is "%";
  - To all other integers is assigned the symbol "#".

- A value returning function `numbers` with a parameter representing a list of integers which returns a list of numbers which are created from the first and last digits of integers in the list.

STEP 2:

Write a program which is using the created functions and displays:

- A list of random integers;
- A list of symbols created from the list of random integers;
- A list of numbers created from the list of random integers;

Use a function `main()` to organize and to call created function appropriately.

A possible output of the program (seed 12 is used):

```
This is a list of random integers:
[8775, 5407, 9669, 6730, 3336, 7252, 1177, 7139, 8905, 5490, 8540, 4729]
This is a list of symbols:
['#', '$', '$', '%', '%', '%', '$', '$', '#', '%', '%', '$']
This is a list of created numbers:
[85, 57, 99, 60, 36, 72, 17, 79, 85, 50, 80, 49]
>>>
```

PROGRAM #2: 10-day TEMPERATURES STATS

STEP 1:

Write following functions:

- A value returning function `temp_day_night` which creates and returns two lists of ten random integers. The random values of the first list are integers between 43 and 47, the random values of the second list are integers between 30 and 34.

- A value returning function `temp_ave` with a parameter representing a list of integers, which returns an average value of the list and the number of elements which has value lower than the average value.

- A value returning function `temp_min` with a parameter representing a list of integers, which returns the minimum of the parameter list and a list of the values from the parameter list, where each min value is replaced by "MIN".

  Example: if the input list is `[12,16,11,12,11,17,17]`,
  the output is `11` and `[12,16,'MIN',12,'MIN',17,17]`

- A value returning function `temp_max` with a parameter representing a list of integers, which returns the maximum of the parameter list and a list of the values from the parameter list, where each max value is replaced by "MAX".

  Example: if the input list is `[12,16,11,12,11,17,17]`,
  the output is `17` **and** `[12,16,11,12,11,'MAX','MAX']`

STEP 2

Write a function `main()` that is using the created function to simulate temperature stats within 10 day period. The function displays:

Day's info:

- The list of day temperatures;
- The average day temperature;
- Number of days with lower than average temperature;
- The min day temperature and it's occurrences;
- The max day temperature and it's occurrences;

Night's info:

- The list of night temperatures;
- The average night temperature;
- Number of nights with lower than average temperature;
- The min night temperature and it's occurrences;
- The max night temperature and it's occurrences;

See a possible output of the program:

```
This program displays info about temperatutes during a 10-day period.

Temperature info about days:
        The list of day temperatures:  [47, 46, 47, 44, 46, 44, 47, 45, 44, 43]
        The average day temperature is  45.3
        There were 5 days with lower than the average temperature.
        The minimum day temperature is  43
        The min occured on following days:  [47, 46, 47, 44, 46, 44, 47, 45, 44, 'MIN']
        The maximum day temperature is  47
        The max occured on following days:  ['MAX', 46, 'MAX', 44, 46, 44, 'MAX', 45, 44, 43]

Temperature info about nights:
        The list of night temperatures:  [30, 33, 30, 33, 32, 30, 33, 30, 32, 33]
        The average night temperature is  31.6
        There were 4 nights with lower than the average temperature.
        The minimum night temperature is  30
        The min occured on following nights:  ['MIN', 33, 'MIN', 33, 32, 'MIN', 33, 'MIN', 32, 33]
        The maximum night temperature is  33
        The max occured on following nights:  [30, 'MAX', 30, 'MAX', 32, 30, 'MAX', 30, 32, 'MAX']
>>>
```