UNIV199 Introduction to Programming with Python

Homework #3

Due: April 12, 2023, Wednesday, 23:59.

FOR loops: Retirement Fund

Retirement funds are designed to help individuals save money for retirement.

For our sample retirement fund of this homework, individuals join it only at the beginning of a year and leave it at the end of another one. They are required to deposit starting money (**deposit**) into it as they start. Until the time of retirement, individuals add money (**contribution**) to the retirement fund on months 2, 5, 8 and 11 of every year. For every month of every year in the retirement fund, a monthly interest is added to the money that has accumulated in the fund. This monthly interest rate is 0.2% in the first 10 years; it is applied as 0.3% afterwards:

$$Monthly\ interest\ rate\ = \begin{cases} 0.2\% & for\ the\ first\ 10\ years \\ 0.3\% & afterwards \end{cases}$$

Do not forget that during the months the user adds money to the retirement fund, monthly interest will be applied **before** the contribution addition to the money in the fund (i.e., first apply the monthly interest rate to the accumulated money and then add the contribution).

Ask the user for the following:

deposit: Money deposited at the beginning

contribution: Contribution the user will make four times a year

start_age: The user's age

retirement_age: The age at which the user will retire

If any of these inputs given by the user is smaller than or equal to zero, program should give a warning and stop.

For the years before retirement, calculate the money in the fund at the end of every month and display end-year balance.

When the user retires, s/he starts taking money from the fund in the form of a **monthly retirement payment**. If the **monthly retirement payment** is smaller than or equal to zero, the program should warn the user and stop.

Now evaluate the fund movements in the 10 years (120 months) of retirement. Ask the user how much money s/he is planning to draw monthly from the fund. At the beginning of every month, the user will receive her/his retirement payment from the fund. After this money retrieval, a monthly interest of 0.3% will be added to the remaining amount in the fund.

At the end of 120 months, if the remaining amount is greater than zero, the remaining money is printed on the screen and given to the user as a whole. Otherwise, the program should indicate that there were not enough funds for this amount of monthly payment.

The program outputs should be as follows (bold entries are sample input):

Sample output 1

```
Enter the amount of deposit: 150000
Enter monthly contribution: 15000
Enter your age: 32
Enter your retirement age: 55
At the end of year 1 the fund balance is 214304.20433098174
At the end of year 2 the fund balance is 280168.79956217285
At the end of year 3 the fund balance is 347631.64977706195
At the end of year 4 the fund balance is 416731.53786020103
At the end of year 5 the fund balance is 487508.18779261905
At the end of year 6 the fund balance is 560002.2874882501
At the end of year 7 the fund balance is 634255.512184506
At the end of year 8 the fund balance is 710310.5484004396
At the end of year 9 the fund balance is 788211.118476268
At the end of year 10 the fund balance is 868002.0057083712
At the end of year 11 the fund balance is 960770.6467022435
At the end of year 12 the fund balance is 1056934.618127848
At the end of year 13 the fund balance is 1156618.189012058
At the end of year 14 the fund balance is 1259950.1766256806
At the end of year 15 the fund balance is 1367064.1129490957
At the end of year 16 the fund balance is 1478098.4172305323
At the end of year 17 the fund balance is 1593196.5748599751
At the end of year 18 the fund balance is 1712507.322789856
At the end of year 19 the fund balance is 1836184.8417421326
At the end of year 20 the fund balance is 1964388.9554501472
At the end of year 21 the fund balance is 2097285.337192733
At the end of year 22 the fund balance is 2235045.7238874612
At the end of year 23 the fund balance is 2377848.138019702

Enter the monthly retirement payment you want to receive: 20000
At the end of 10 years, you will receive the remaining balance of 514037.7922130909
```

Sample output 2

```
Enter the amount of deposit:  50000
Enter monthly contribution: 8000
Enter your age: 45
Enter your retirement age: 58
At the end of year 1 the fund balance is 83567.60260482816
At the end of year 2 the fund balance is 117949.7488649486
At the end of year 3 the fund balance is 153166.20430768203
At the end of year 4 the fund balance is 189237.21408604848
At the end of year 5 the fund balance is 226183.51461725312
At the end of year 6 the fund balance is 264026.3455035891
At the end of year 7 the fund balance is 302787.46174261003
At the end of year 8 the fund balance is 342489.14623359183
At the end of year 9 the fund balance is 383154.2225874735
At the end of year 10 the fund balance is 424806.0682476404
At the end of year 11 the fund balance is 472887.1804757226
At the end of year 12 the fund balance is 522728.060463584
At the end of year 13 the fund balance is 574393.1156765443

Enter the monthly retirement payment you want to receive: 15000
There is not enough money in the fund for this amount of monthly payment.
```

Sample output 3

```
Enter the amount of deposit: 0
Invalid deposit value!
```

Sample output 4

```
Enter the amount of deposit: 5000
Enter monthly contribution: 2000
Enter your age: 0
Invalid age value!
```

Sample output 5

```
Enter the amount of deposit: 10000
Enter monthly contribution: 2000
Enter your age: 45
Enter your retirement age: 55
At the end of year 1 the fund balance is 18331.236231343537
At the end of year 2 the fund balance is 26864.636307775192
At the end of year 3 the fund balance is 35605.10589024682
At the end of year 4 the fund balance is 44557.66967934056
At the end of year 5 the fund balance is 53727.474303856856
At the end of year 6 the fund balance is 63119.79127949636
At the end of year 7 the fund balance is 72740.02003933642
At the end of year 8 the fund balance is 82593.69103784443
At the end of year 9 the fund balance is 92686.46893021259
At the end of year 10 the fund balance is 103024.15582884145

Enter the monthly retirement payment you want to receive: 0
Invalid monthly retirement payment!
```

Save your program as **hw03*yoursurname_yourname*.py**. Upload your file to Blackboard at "Homework 3".

Make sure you place comments in your program. Place your name, ID as comments at the top.

You should only use the features and commands you have learnt until this homework was given. For this particular homework, you are not permitted to use WHILE loops. Also, you are not allowed to use BREAK, CONTINUE, RETURN, QUIT or any other statement that prematurely stops your program.

While doing all your homework assignments, remember that:

- ***You should not work together,***
- ***You should not give or take any files,***
- ***You should not give or take help other than simple verbal hints.***