DT265/B CMPU4060: Lab 4

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Instructions

Before you begin, take out a pen and paper. Put a title of Lab 4 on it and the date. Answer the questions below and make any notes or questions, comments or thoughts on your page.

Remember the instructions to lab 2? You were asked to complete the problems and be in a position to demonstrate them and explain them today? Be ready to demonstrate a program in today's lab.

Submit your code at the end of the lab through the Lab 4 link on webcourses. If you do not finish the lab, work on it over the weekend and submit a solution to Q1 – Q3 by Tuesday.

This lab is all about banking! Calculating interest rates is something that computers are very good at.

Exercises

1. (*2 points*) Write a program `bankbalance.py` to calculate the new balance of a savings account if simple interest is applied at a rate of $r\%$ per year. Simple interest is a percentage applied to the original amount or principle, P_o, at a percentage rate, r, for a given number of periods, t.

$$b = P_o + P_o \times r \times t \tag{1}$$

Ask the user for the principal, P, interest rate, r, number of years, t, and display the new balance, b. , For example, a principle of €1,000, compounded yearly at 2% for 6 years:

$$1,120 = 1,000 + 1,000 \times 0.02 \times 6 \tag{2}$$

Use functions, e.g. `main()` and `simple_interest(principle, rate, periods)` to create the program.

2. (*5 points*) Expand your program `bankbalance.py` to calculate the new balance of a savings account if interest is compounded n times per year.
Ask the user for the principal, P, interest rate, r, number of years, t, and number of compounding periods per year, n, and display the new balance, b.
Use the formula:

$$b = P(1 + \frac{r}{n})^{nt} \tag{3}$$

For example, a principle of €1,000, compounded monthly at 2% for 6 years:

$$b = 1000(1 + \frac{0.02}{12})^{12\times 6} = 1,127.38 \tag{4}$$

Create appropriate new function(s) and expand the *main*() function to solve the following problem.
Use your program to determine the difference over 20 years on a €1,000 balance between compounding yearly and compounding monthly at 8% interest.

3. (*2 points*) Calculate the yield on a principle of €1,500 for 3 years compounded quarterly at 4.3%. Adapt your program to so that it prints a table for 12 quarters showing the quarterly running balance. (Hint: Try a for loop and use a simple interest calculation).

```
1,500 at 4.3% compounded quarterly for 3 years yields 1705.36
Quarter:  1 Balance: 1516.12
Quarter:  2 Balance: 1532.42
Quarter:  3 Balance: 1548.90
Quarter:  4 Balance: 1565.55
Quarter:  5 Balance: 1582.38
Quarter:  6 Balance: 1599.39
Quarter:  7 Balance: 1616.58
Quarter:  8 Balance: 1633.96
Quarter:  9 Balance: 1651.52
Quarter: 10 Balance: 1669.28
Quarter: 11 Balance: 1687.22
Quarter: 12 Balance: 1705.36
```

4. (*1 point*) Can you make your program format the output exactly as above?

5. (*1 point*) Enhance your program so that it can handle different inputs from the user, e.g. a rate, r, input at 0.04 or 4 or even 4%.