

111A Introduction to Computer and Computer Science

Homework Assignment #4

Due: 10/31 12:00:00

In this homework assignment, you will practice how to create your own functions by solving one of the most difficult issues in your entire life – managing your money for something. As you have learned all the related knowledge during the lectures (if, while, for, def, and so on...).

Problem #1: Saving your money for the future

Assuming you have graduated from NYCU and now have a great job, your parents start to push you to buy a f***ing house for yourself. Since the current price of house in Taiwan is pretty irrational and ridiculous, you need a plan to save your down payment. In this homework, we are going to determine how long it will take to save enough money for paying the down payment.

Before you start to write the code, here are some basic assumptions for this problem:

1. Call the cost of your target “**target_price**”.
2. Assuming the down payment is 25% of your target price, which leads you this result $\text{down payment} = 0.25 \times \text{target price}$.
3. Assuming your monthly salary is “**monthly_salary**”.
4. Assuming you are going to dedicate a certain percentage of your monthly salary for the down payment. Call it “**saving_rate**”. Be careful, this number should be in decimal form, i.e. $\text{saving rate} = 0.87$ for 87%.
5. Call the amount that you have saved “**current_savings**”. You should start with $\text{current savings} = 0$ unless you have wonderful parents or you are “Fa Đà Cái”.
6. Assuming you also invest your current savings wisely, with an annual return of “**r**”. In other words, your account of current savings will receive an additional money $\left(\text{current savings} \times \frac{r}{12}\right)$ at the end of each month. For simplicity, let assume $r = 0.04$.

Please write function called “**savingPlan**” that aims to calculate how many months it will take you to save up enough money for the down payment.

Sample code:

```
def savingPlan(target_price, monthly_salary, saving_rate):
    """
    Params:
        target_price:  int, target_price >= 1
        monthly_salary: int, monthly_salary >= 1
        saving_rate:    float, 0 <= saving_rate <= 1

    Returns:
        target_month:  int

    """
    downpayment = 0.25 * target_price
    current_saving = 0
    annual_return_rate = 0.04

    return target_month
```

Problem #2: Saving your money for the future, part II

In the previous problem, we have realized that there is no chance for us to buy a luxury apartment in our entire life, even though you earn 100k per month. However, as an optimistic person, having a wonderful and unreal dream might keep us staying hungry and foolish. Therefore, it is our duty to fight for a better future for our family or those we cared for. As an employee, the easiest way to achieve this objective is asking your boss to raise your salary. Regarding the process of arguing with your boss, let us assume that we have already earned the welfare of raising salary in every six months.

Before you start to write the code, here are some basic assumptions for this problem:

1. All parameter is same as we defined in the problem #1.
2. Call your semi-annual salary raise “**semi_annual_raise**”. Again, it should be a decimal number, i.e. semi-annual raise = 0.05 for 5%.
3. Raise your salary by this rate in **every six months**.

Please write function called “**savingPlan2**” that aims to calculate how many months it will take you to save up enough money for the down payment.

Sample code:

```
def savingPlan2(target_price, monthly_salary, saving_rate,
               semi_annuam_raise):
    """
    Params:
        target_price:      int, target_price >= 0
        monthly_salary:    int, monthly_salary >= 0
        saving_rate:       float, 0 <= saving_rate <= 1
        semi_annual_raise: float, 0 <= semi_annuam_raise, raise
                           monthly_salary after every 6 months
                           ex. monthly_salary: Jan-10k, Feb-10k,
                           Mar-10k, Apr-10k, May-10k, Jun-10k,
                           Jul-10.5k, ...

    Returns:
        target_month:      int

    """
    downpayment = 0.25 * target_price
    current_saving = 0

    annual_return_rate = 0.04

    return target_month
```

Hand in procedure:

As we had mentioned in the lecture, you should list all your collaborators in your programs. Here is the template:

```
""  
Created on Sun Aug 7 01:23:45 2022  
  
@author: Xi Winnie, student ID  
  
@collaborators: Jane Doe, her student ID  
                John Doe, his student ID  
""
```

Please save your code as a “.py” file, where the file name should follow this format:

111A_hw#4_ID.py

For example,

111A_hw#4_0123456789.py

Please be aware. **We are not going to accept any homework file with wrong file name or without signature.** Please double check the content of your file.

Once you have accomplished your works, you can upload your homework to the “E3@NYCU” system. There will be a section for uploading your homework.