# PFC - Assignment 1
# Income tax calculator
# with Functions and Robus validation

As your first assignment this semester, you are to write a C program that calculates the income tax.

## LEARNING OUTCOME

Upon successful completion of this assignment, you will have demonstrated the ability to use sequence, selection, iteration constructs as well as functions.

## INTRODUCTION

From 2009, people must pay income tax depended on the total amount he/she earns. Income tax is the kind of progress tax, which applies higher tax rates to individuals posting higher earnings.

Firstly, taxable income is identified. Taxable income is calculated by deducting total deduction (personal allowance and any deductible reliefs you are entitled to) from your total earnings.

Here, five kinds of deductions:

1. 4.000.000 VND per month for yourself

2. 1% of total amount for health insurance

3. 5% of total amount for pension contribution

4. 1.600.000 VND for each dependant under 18 age

5. any gift of charity

Then, taxable income is multiplied by the tax rate of according brackets you belong in.

Here, seven tax brackets:

1. taxable income of **5 millions VND or less** attracts tax at

   **5%**

2. taxable income of **more than 5 millions and not more than 10 millions** attracts tax at **10%**.

3. taxable income of **more than 10 millions and not more than 18 millions** attracts tax at **15%**.

4. taxable income of **more than 18 millions and not more than 32 millions** attracts tax at **20%**.

5. taxable income of **more than 32 millions and not more than 52 millions** attracts tax at **25%**.

6. taxable income of **more than 52 millions and not more than 80 millions** attracts tax at **30%**.

7. taxable income of **more than 80** attracts tax at

   **35%**.

Example 1

Mr. A gets the gross salary of 10 millions VND per month. He has two children under 18; pays pension contribution of 5%, and health insurance of 1%; no any gift of charity.

His income tax for this month is calculated as follows

All deductions:

+ For himself: 4 millions VND;

+ Pension contribution: 10 x 5% = 0.5 millions VND

+ Health insurance: 10 x 1% = 0.1 millions VND

+ For 2 dependants: 1.6 x 2 = 3.2 millions VND;

The total deduction: 4 + 3.2 + 0.6 = 7.8 millions VND

Taxable income: 10 – 7.8 = 2.2 millions VND

Tax amount: 2.2 x 5% = 0.11 millions VND

Net income: 9.890 millions

So, with total earning of 10 millions VND per month, Mr. A must pay income tax of 0.11 millions VND and therefore his net income is 9.89 millions VND.


Example 2

Mr. B gets 100 millions VND per month. He has 1 child under 18; pays pension contribution of 5%, and but does not pay health insurance. He also pays 1 million VND for gift of charity.

So, his income tax is caluculated as follows

1. All deductions:

+ For himself: 4 millions VND;

+ Pension contribution: 100 x 5% = 5 millions VND

+ Health insurance: 0 millions VND

+ For 1 dependant: 1.6 millions VND;

+ Gift of charity: 1 million VND;

The total deduction: 4 + 5 + 1.6 + 1= 11.6 millions VND

2. Taxable income: 100 - 11.6 = 88.4 millions VND

3. Amount on tax:

+ Bracket 1: Taxable income no more than 5 millions VND, tax rate 5%:

5 x 5% = 0.25 millions VND

+ Bracket 2: Taxable income more than 5 and no more than 10 millions VND, tax rate 10%:

(10 - 5) x 10% = 0.5 millions VND

+ Bracket 3: Taxable income more than 10 and no more than 18 millions VND, tax rate 15%:

(18 - 10) x 15% = 1.2 millions VND

+ Bracket 4: Taxable income more than 18 and no more than 32 millions VND, tax rate 20%:

(32 - 18) x 20% = 2.8 millions VND

+ Bracket 5: Taxable income more than 32 and no more than 52 millions VND, tax rate 25%:

(52 - 32) x 25% = 5 millions VND

+ Bracket 6: Taxable income more than 52 and no more than 80 millions VND, tax rate 30%:

(80 - 52) x 30% = 8.4 millions VND

+ Bracket 7: Taxable income more than 80 and no more than 82.8 millions VND, tax rate 35%:

(88.4 - 80) x 35% = 2.94 millions VND

Total amount on tax: (0.25 + 0.5 + 1.2 + 2.8 + 5 + 8.4 + 2.94) = 21.09 millions VND

So, with total earning of 100000 millions VND per month, Mr. B must pay income tax of 21.09 millions VND.

## SPECIFICATIONS

Your program prompts for and accepts the following information:

- The income earned by the employee (including pension contribution and health insurance or not)
- Number of dependants under the age of 18
- Authourized deductions (any gift of charity…)

## TECHNICAL NOTES

### Conversion Specifiers

By default, the `%lf` printf conversion specification displays six (6) decimal places without leading spaces. To limit the number of decimal places to two (2), use `%.2lf` instead of `%lf`. To display the number right-justified in a field of 10 columns, use `%10.2lf`. This will align the decimal points on your output.

### Program Constants

Design your program so that all of the constants for 2009 can be changed for subsequent years with minimal effort and a single recompilation. E.g., you can define 'constants' that may change from year to year, use the preprocessor directive:

```
#define SYMBOLIC_NAME VALUE
```

Place this directive before your main program and after your header comments. Use the SYMBOLIC_NAME within your program code and set the VALUE in the preprocessor statement. For example, for 2009

```
#define RATE_PENSION  0.05
```

Then statements for calculating the deduction for pension would be as below:

```
    double income, p;


    printf("Enter income : ");
    scanf("%lf", &income);
```

```
        p =  income * RATE_PENSION;

        printf("Deduction for pension is %10.2lf\n", p);
```

## FUNCTION DESIGN

Design your program so that another programmer can modify it with minimal intrusion.  Divide your code into functions to achieve the highest possible cohesion and the lowest possible coupling. For guidelines on designing functions see the Modularity reading.

Your program asks the user whether or not to continue with another run, and if the user answers yes, your program continues without terminating execution.
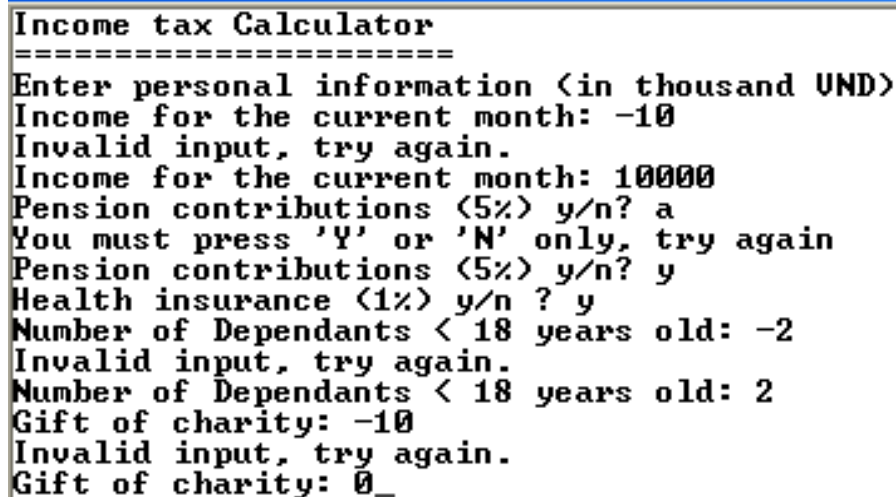
## ROBUST VALIDATION

Your program accepts and validates any input whatsoever from the user.  DO NOT assume that the user will only enter numbers, white space or possibly a decimal point, but no other characters.  Your program generates an appropriate response for any erroneous input.  Examples of unacceptable or unreasonable input include:

- input is negative in value

- more than one decimal point appears in floating-point input

- characters are embedded in numeric input

- character is different from 'y' and 'n'

- gift of charity exceeds the income

- a decimal point  appear in integer input

Your output program may look something like

```
Income tax Calculator
========================
Enter personal information (in thousand VND)
Income for the current month: -10
Invalid input, try again.
Income for the current month: 10000
Pension contributions (5%) y/n? a
You must press 'Y' or 'N' only, try again
Pension contributions (5%) y/n? y
Health insurance (1%) y/n ? y
Number of Dependants < 18 years old: -2
Invalid input, try again.
Number of Dependants < 18 years old: 2
Gift of charity: -10
Invalid input, try again.
Gift of charity: 0_
```

```
Gross Income:              10000.0
Deduction
   Personal allowance:      4000.0
   Pension contributions:   500.0
   Health insurance:        100.0
   Dependant:               3200.0
   Charity:                   0.0
----------------------------------
Total:                     7800.0
Taxable Income:            2200.0
Tax:                       110.0
Net Income:                9890.0
Another run (y/n)? _
```

You can run the taxCalculator1.exe  file to see how your program should work.