Pair Programming Assignment

Due Date: Demonstration on

Part-time Wedn Class : 11 March 2024 (Monday)

Full-time Tues Class : 12 March 2024 (Tuesday)

In this assignment, you are required to work in a group of 2 (maximum 3) to develop a tax assessment program based on real requirements from HK Inland Revenue Department. You have to demonstrate your program to the lecturer/tutor on the time mentioned above corresponding to your group (just before Easter holiday). In your individual reflective report to be submitted later, you should include the URL to the program code repositories in Github and discuss your pair programming experience. The details of individual reflective report will be posted in due course.

1. Overview of the assignment

Please visit the HK Government web site on online tax assessment (https://www.gov.hk/en/residents/taxes/etax/services/tax_computation.htm) You are required to develop a program (in any computer language you prefer) that should exactly reflect the computed tax as calculated online (Choose the year of '2022-23'). The developed system need NOT be web-based (Line input and output are acceptable) and you can choose any programming language you prefer.

   a. Your program should handle:

      i. Input : husband and wife's personal income

      ii. Output : (a) calculated MPF mandatory contribution based on personal income

         (b) Salaries Tax to be paid if separate assessment assumed

         (c) Salaries Tax to be paid if joint assessment assumed

         (d) recommendation: whether joint assessment should be recommended

   c. Your program should have the flexibility of doing automated testing (that is, program can specify or accept multiple sets of input and produce multiple sets of output for testing result verification). You may use a test driver program or Junit/PyUnit to achieve that. Automated testing will be covered in later lectures.

   d. You should adopt the pair programming principles that two programmers sit together to code the problem with one programmer reviewing and testing the code made by another programmer. The role should be switched whenever appropriate. You are encouraged to use some remote access solutions that allow online sharing of code and discussion. You may have to discuss the use of such collaboration tool and also your experience in pair pgrogramming in your individual report.

   e. In order to simply the calculation, you may disregard the ad-hoc tax deduction scheme and assume the following items are not required to be entered (that is, set to ZERO):

Outgoings and expenses, self education expenses, approved charitable donation, home loan interest, elderly residential care expenses, Personal disability allowance, No. of any types of dependents, No. of properties.

    f.   Design of test cases : You may adopt approach from test-driven development as discussed in Agile development lectures – that is, you design simple and regular cases and see if your program can handle such cases correctly. If not, you go back to rework on the codes. If the results are correct, then you test your program with more complicated cases. During the process, you may have to do code refactoring on regular basis – that is, refine the code to make it more readable, simpler or more efficient .

2. In design of test cases, please pay attention to following scenarios. You have to further elaborate the design of test cases in your individual reflective report to be submitted later.

(a) the tax brackets (with different tax rates for different brackets of income) and no tax for those low income group;

(b) the minimum annual income that MPF tax deduction is not applicable and the maximum cap set for tax deduction;

(c) In case of extremely high annual income, 15% standard tax rate is applicable (Note that basic personal allowance need not be deducted when calculating standard tax rate). For each case, you should compute the tax payable both under progressive tax rate and under standard tax rate with the lower tax payable be adopted.

(b) the feasibility of joint tax assessment against separate assessment

Refer to the following URL for tax assessment guideline (for the second link, you do not have to study property tax in detail as it can be assumed that there are no property tax)

Tax bracket: https://www.gov.hk/en/residents/taxes/taxfiling/taxrates/salariesrates.htm#pr

MPF deduction: https://www.ird.gov.hk/eng/pdf/pam38e.pdf

Joint Assessment : https://www.ird.gov.hk/eng/pdf/ind_jae.pdf

Some extractions of the above information are listed in the following pages:

Year of Assessment 2018/19 onwards#

	Net chargeable Income	Rate	Tax
	$		$
On the First	50,000	2%	1,000
On the Next	50,000	6%	3,000
	100,000		4,000
On the Next	50,000	10%	5,000
	150,000		9,000
On the Next	50,000	14%	7,000
	200,000		16,000
Remainder		17%	

Mandatory Provident Fund Scheme (MPFS)

Employees (full-time or part-time) and self-employed persons, except the exempt persons under the Mandatory Provident Fund Schemes Ordinance ("MPFSO") are required to participate in MPFS. Employees or self-employed persons are required to make regular mandatory contribution calculated at 5% of the person's income, subject to the minimum and maximum relevant income level. The minimum and maximum relevant income level are as follows:

Period	Minimum income level ($)
Nov 2013 onwards	7,100

Period	Maximum relevant income level ($)	Maximum monthly contribution ($)
Jun 2014 onwards	30,000	1,500

Under the provisions of the Inland Revenue Ordinance ("IRO"), mandatory contributions to MPFS are deductible in computing the assessable income/profits of an employee or a self-employed person. The maximum deduction for each year of assessment is :

Year of assessment	Maximum deduction ($)
2016/17 onwards	18,000

Joint Assessment Example

Example 1

For the year of assessment 2021/22, the monthly salaries of Mr and Mrs Chan were $45,000 and $10,000 respectively. They have a daughter and the couple agreed and nominated Mr Chan to claim the child allowance. How should Salaries Tax be computed?

If computed under Separate Taxation

				Mr Chan $	Mrs Chan $
Income				540,000	120,000
Less : MPF contributions				18,000	6,000
Net Total Income				522,000	114,000
Less : Basic allowance				132,000	132,000
Child allowance				120,000	-
Net Chargeable Income				270,000	-
First	$50,000	@	2%	1,000	
Next	$50,000	@	6%	3,000	
Next	$50,000	@	10%	5,000	
Next	$50,000	@	14%	7,000	
Remainder	$70,000	@	17%	11,900	
Tax thereon				27,900	
Less : 100% tax reduction (capped at $10,000) (Note)				10,000	
Tax payable				17,900	-

If computed under Joint Assessment

				Mr Chan $	Mrs Chan $	Joint $
Income				540,000	120,000	
Less : MPF contributions				18,000	6,000	
Net Total Income				522,000	114,000	636,000
Less : Married person's allowance						264,000
Child allowance						120,000
Net Chargeable Income						252,000
First	$50,000	@	2%			1,000
Next	$50,000	@	6%			3,000
Next	$50,000	@	10%			5,000
Next	$50,000	@	14%			7,000
Remainder	$52,000	@	17%			8,840
Tax thereon						24,840
Less : 100% tax reduction (capped at $10,000) (Note)						10,000
Tax payable						14,840

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Note: For 2021/22, 100% of the final tax payable under profits tax, salaries tax and tax under personal assessment would be waived, subject to a ceiling of $10,000 per case.

It can be seen from the example above that Joint Assessment will result in tax savings amounting to $3,060 (i.e. $17,900 - $14,840).