

## Fall 2021 – Logic TEST 01

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**Instructions:** On this test you will complete one longer question (Part A) followed by one shorter question (Part B). The name of the two RAPTOR files should be:

1. YourC#\_PartA.rap
2. YourC#\_PartB.rap

Upon completing both questions, Part A and Part B, submit the files inside a zipped folder named `YourC#_Test01.zip` to the **Test 01** folder on D2L by the required due date.

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### Part A (40 marks)

The first component of your test is you must develop a credit card payment module similar to one your bank probably has through its online website.

- The program should begin by asking the user to enter any balance that has yet to be paid. You should ensure the value entered by the user is \$0.00 or greater.
- The program should also start by asking the user to enter the annual interest rate of the credit card. For our purposes, we will restrict the interest rate between 0% and 30%, inclusive.

After reading in the initial input the program should step through a payment plan month by month. Each month the program should:

- Ask the user to enter any additional purchases made on that card, if any exist
  - Purchases must be either 0.00 or greater or a terminating value of -1
- Display previous card balance
- Calculate any incurred monthly interest
- Display total of the new purchases entered
- Display the total bill for the credit card for the month in question
- Prompt the user for the amount they want to pay towards this bill
- Display the new credit card balance

The program should continue to iterate month by month until a point where the user has paid off their credit card in full. Once the card is paid in full a congratulatory message should be displayed, as well as the total amount paid during the duration of the program, the total principle paid, and the total interest paid.

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**Hint:** Store the dollars amount and cents value in the sperate variables. If you do not do this you will run into issues with rounding errors from using floating point values.

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## Master Console Output

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\* CREDIT CARD PAYMENTS \*

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Please enter starting balance on card: 1000

Credit card Rate %: 20.0

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### MONTH 1

Please enter any purchases you have made on your card this month (-1 to stop): 100

Please enter any purchases you have made on your card this month (-1 to stop): 50

Please enter any purchases you have made on your card this month (-1 to stop): 25

Please enter any purchases you have made on your card this month (-1 to stop): -1

PREVIOUS BALANCE ON CARD: 1000

INTEREST INCURRED – MONTH 1: 16.67

TOTAL NEW PURCHASES – MONTH 1: 175

AMOUNT TO BE PAYED: 1191.67

Please enter the amount you wish to pay towards your card balance: \$500

NEW BALANCE – MONTH 1: 691.67

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### MONTH 2

Please enter any purchases you have made on your card this month (-1 to stop): 300

Please enter any purchases you have made on your card this month (-1 to stop): -1

PREVIOUS BALANCE ON CARD: 691.67

INTEREST INCURRED – MONTH 2: 11.53

TOTAL NEW PURCHASES – MONTH 2: 300

AMOUNT TO BE PAYED: 1003.20

Please enter the amount you wish to pay towards your card balance: \$700

NEW BALANCE – MONTH 2: 303.20

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### MONTH 3

Please enter any purchases you have made on your card this month (-1 to stop): 100

Please enter any purchases you have made on your card this month (-1 to stop): 90

Please enter any purchases you have made on your card this month (-1 to stop): -1

PREVIOUS BALANCE ON CARD: 303.20

INTEREST INCURRED – MONTH 3: 5.05

TOTAL NEW PURCHASES – MONTH 3: 190

AMOUNT TO BE PAYED: 498.25

Please enter the amount you wish to pay towards your card balance: \$498.25

NEW BALANCE – MONTH 3: 0.00

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CONGRAGULATIONS YOU HAVE PAID YOUR CARD BALANCE OFF!

TOTAL PAID: \$1698.25

PRINCIPAL PAID: \$1665.00

INTEREST PAID: \$33.25

## Part B (30 marks)

The second part of the test is to implement a simple income tax calculator for Ontarians. In Ontario we pay both Provincial and Federal tax. **In this question you will be implementing a Provincial tax calculator.**

### Provincial Tax – Income Sources

To calculate the amount of provincial tax you owe you must first start by prompting the user to provide all their EMPLOYMENT income sources. EMPLOYMENT income is the pre-tax amount of earnings made working for a company. As individuals can work more than one job you should allow the user to continue to enter pre-tax earnings amounts while they continue to answer ‘Y’ for yes.

Also, income can come from investments. INTEREST is money made on money and for tax purposes it is actually taxed the same way EMPLOYMENT income is. We need to prompt the user for the total amount of interest they earned this year.

Stocks are also an income vehicle and come in two forms: 1) ELIGIBLE and 2) INELIGIBLE stocks. ELIGIBLE stocks are Canadian corporations who pay dividends to Canadian residents while INELIGIBLE are often Organizations outside of Canada. ELIGIBLE and INELIGIBLE stocks have gross-up rates that contribute to taxable income; specifically, ELIGIBLE stocks have a 38% gross-up rate while INELIGIBLE stocks have a 15% gross-up rate. For instance, if a user received \$100 INELIGIBLE dividend this would contribute \$115 dollars to their taxable income. You will need to prompt the use for both ELIGIBLE and INELIGIBLE dividend amounts.

Lastly, with respect to income sources individuals can earn profit by selling CAPITAL. The sale of CAPITAL is referred to as CAPITAL GAINS. An example, of a capital gain is selling a stock and earning a \$1000 more than you paid for it. You need to prompt the user for their total capital gains.

#### Provincial Tax – Taxable Income

Once you have all your income sources you can calculate the taxable income amount. To do this you need to use the income sources provided by the user earlier; specifically, you need to add total EMPLOYMENT INCOME, INTEREST, ELIGIBLE/INELIGIBLE DIVIDENDS (with gross-up), and 50% of capital gains.

- **NOTE:** You only are only taxed on 50% of capital gains. This is why it is often advantageous to have investments opposed to labour earning substitutes

#### Provincial Tax – DEDUCTION Information

In order to calculate the Ontario tax owing we have to apply the credits we qualify for. All Ontario workers qualify for the Employment Insurance (EI) and Canadian Pension Plan (CPP) credits. When you work for any company in Ontario they automatically deducted EI and CPP. The amount deducted for EI is \$0.0158 for every dollar earned up to a maximum total of \$889.54. Similarly, CPP has a contribution rate of 5.45% meaning for every \$1 you are contributing \$0.0545 to CPP. CPP also has a maximum contribution of \$3166.45.

Individuals can also contribute to Registered Retirement Savings Plans (RRSPs). This is an investment account that once money is deposited cannot be withdrawn without major penalty until the age of 65. We need to prompt the user for any RRSP contributions they made this year.

#### Provincial Tax – Ontario Tax Amount

Once you have your taxable income calculation and your deduction information we can begin calculating taxes owed. The first item is to calculate the Ontario taxes on taxable income. To solve for this you need to use the below 2021 Provincial Tax table. Consider the below example.

**EXAMPLE:** An individual with a taxable income of \$93,229 would pay 5.05% on the first \$45,142, 9.15% on the next \$45,145 and lastly 11.16% on the remaining \$328.33:

- $\$45,142 * 0.0505 = \$2,279.67$
- $\$45,145 * 0.0915 = \$4,130.77$
- $\$2,942 * 0.1116 = \$328.33$
- On \$93,229 taxable income, an Ontarian must pay: **\$6,738.77**

Income Tax Rate	Income Bracket
5.05%	\$0-\$45,142

9.15%	\$45,142.01-\$90,287
11.16%	\$90,287.01-\$150,000
12.16%	\$150,000.01-\$220,000
13.16%	Over \$220,000

Once the Ontario Tax on Taxable Income has been calculated you need to apply the deductions. Every Ontarian does not pay tax on the first \$10,880 dollars they earn. The credit applied is that of the lowest tax bracket (i.e. 5.05% of 10,880) which is roughly a \$500 credit. A similar calculation is done for CPP and EI.

Furthermore, once the above credits are applied there are a couple more additional charges. All Ontario works who have an Ontario Tax amount of greater than \$4874 pay a surtax; essentially, additional tax for those who pay a lot of tax. The surcharge is calculated as:

- 20% on the amount of Ontario tax over \$4874
- 36% on the amount of Ontario tax over \$6237

All Ontarians also qualify for a \$249 reduction credit. If you have children there are additional credits but I did not include these for this program.

There are also credits for ELIGIBLE/INELIGIBLE DIVIDENDS. EIGIBLE dividends have a 10% credit rate on their gross-up value while INELIGIBLE dividends have a 2.9863% credit on their gross-up value.

Lastly, all Ontarians filling their taxes must contribute to Ontario's public health care system by paying a health care premium. The healthcare premium paid is based on taxable income and the exact amount paid can be found here:

<https://www.canada.ca/en/revenue-agency/services/forms-publications/payroll/t4032-payroll-deductions-tables/t4032on-jan/t4032on-january-general-information.html#Toc333578511>

### Master Console Output

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*****
*          PROVINCIAL TAX CALCULATOR          *
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***INCOME SOURCES***

Do you have an EMPLOYMENT income source to enter? Y
Please enter the amount of income to report from this source: $90000
Do you have another EMPLOYMENT income source to enter? Y
Please enter the amount of income to report from this source: $5000
Do you have another EMPLOYMENT income source to enter? N
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Please enter how much INTEREST you earned across all accounts: \$200

Please enter how much in ELIGIBLE DIVIDENDS you earned: \$300

Please enter how much in INELIGIBLE DIVIDENDS you earned: \$100

Please enter how much in CAPITAL GAINS you earned: \$1000

\*\*\*TAXABLE INCOME\*\*\*

Taxable EMPLOYMENT Income: \$95000

Taxable Interest: \$200

ELIGIBLE DIVIDENDS with Gross-Up (38%): \$414

INELIGIBLE DIVIDENDS with Gross-Up (15%): \$115

Taxable Capital Gains (50%): \$500

Total Taxable Income (Before Deductions): \$96,229

\*\*\*DEDUCTION INFO \*\*\*

Please enter any RRSP contributions: \$3000

Total Taxable Income: \$93,229

EI Premiums Payable: 889.54

CPP Contributions: 3,166.45

\*\*\* Ontario Tax Amount \*\*\*

Total Income: \$93,229

Ontario Tax on Taxable Income : \$6,738.77

(-) CREDIT – Personal Amount: \$549.44

(-) CREDIT – EI/ CPP Premiums: \$204.80

Ontario Tax with Credits Applied: \$5,984.53

(+) ADD - Ontario Surtax: \$222.11

(+) ADD – Ontario Health Premium: \$750

(-) SUBTRACT – Personal Tax Reduction: \$249

(-) SUBTRACT - ELIGIBLE DIVIDENDS (10%): \$41.40

(-) SUBTRACT - INELIGIBLE DIVIDENDS: (2.9863%): \$3.43

\*\*\*ONTARIO TAX AMOUNT: \$6,662.81\*\*\*