Computer Programming for Scientists & Engineers (COMP 1012)
Winter Semester 2024
Due Date: Feb 2, 11:59 PM

Assignment #1

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Material Covered:
• Calculations
• if – elif – else
• While Loop

Assignment Guidelines

- **All students in this course must read and meet the expectations described in the Expectations for Individual Work in Computer Science - Department of Computer Science (umanitoba.ca) (follow the link and read all information provided).**

- **Assignments must be completed using course material. Do not use advanced material we have not covered in the course, even if you have prior programming experience. Assignment 1 should be completed using concepts from Weeks 1-3.**
- **Assignments must follow the programming standards document published on the course website on UM Learn.**
- **Submit one .py file per question. Name the files using your name, the assignment number, and the question number, exactly as in this example: LastnameFirstnameA1Q2.py. Use your name exactly as shown in UM Learn (without hyphens, if applicable).**

- **Do NOT zip the files that you submit.**
- **You may submit the assignment multiple times, but only the most recent version will be marked.**
- **After the due date and time, a late penalty of 2% per hour, or portion of hour, will be applied. After 49 hours, the penalty is 100% and submissions will no longer be accepted. The date and time of the last file submitted controls the mark for the entire assignment.**
- **These assignments are your chance to learn the material for the exams. *Code your assignments independently.* We use software to compare all submitted assignments to each other and pursue academic dishonestly vigorously. You must complete the Honesty Declaration before you will be able to submit your assignment.**

Question 1- A2Z Book Seller

You run an e-commerce platform that sells books online. Business policies for your store are:

- You operate in two Canadian provinces where the tax structure is as follows:
  - MB: PST is 7% and GST is 5%.
  - ON: HST is 13%
- Your profit margin on each item is 40%.
  - Example: If you sell a book for a retail price of $100, the cost incurred by you is $60, and your margin is $40.
- Your inventory is given in the table below. Currently, you are also offering a bookstore discount on selected products. Some discounts are in percentage of the selling price, some are on a flat amount.

Book Name	Retail Price	Bookstore Discount
BOOK1	$10	
BOOK2	$35	20%
BOOK3	$25	$5
BOOK4	$15	
BOOK5	$30	10%
BOOK6	$45	$10

- Customers provide the quantity of each book that they buy.
    - Example: Customer can buy 2 BOOK1 and 5 BOOK4.
- For each book purchased, customers earn 8 rewards points.
- If the customer is a staff, they get an additional 5% discount on the total sale price.
    - Sale price is: Total Retail Price amount - Total Bookstore Discount Amount
- There is a fixed shipping cost of $8 for transactions less than $200 (exclusive of taxes); otherwise, shipping is free.
- Tax is applied to the final payable amount at the end

Write a Python program that interacts with the user to enter details for each book purchased until the user decides to stop. For each item, the program should prompt for:

- Book Name
- Quantity

Ask the following questions either at the beginning or at the end, however, you may like:

- The province where the customer wants the delivery of shipment.
- If the customer is a staff.

The program should then calculate and display the following information:

- Total Retail Price of the books the customer bought (in $).
- Total bookstore discount that customer got (in $).
- Staff discount (in $). Show 0 if the customer is not a staff.
- Final Sale Amount (in $). This is the cost after both Bookstore and Staff discounts and doesn't include tax.

- Reward points earned
- Tax Amount
    - Show PST and GST if shipment delivery is in MB.
    - Show HST if shipment delivery is in ON.
- Shipping cost
- Total amount paid by customer (this includes applicable taxes)
- The profit your bookstore made on the transaction

Sample Input and Output:

```
Please enter province for delivery: ON
Are you a staff (Y or N): N
Please enter the book name: BOOK2
Please enter the quantity of this book: 2
Do you want continue purchase (Y or N):  Y
Please enter the book name: BOOK1
Please enter the quantity of this book: 1
Do you want continue purchase (Y or N):  N

OUTPUT:
------------------------Customer Billing ------------------------
Total Retail price of the order is: 80.0
Total bookstore discount 14.0
Total staff discount 0.0
Final sale amount 66.0
Total rewards point 24
Total gst 0
Total pst 0
Total hst 8.58
Total Shipping cost 8
Total amount paid by customer 82.58
Total profit of bookseller 18.0
```

Question 2 - Number Analyzer

Write a Python program that analyzes a sequence of numbers entered by the user. The program should continue to prompt the user for numbers until they enter the word "DONE", signaling the end of the input.

For each entered number, classify and print the following information:

Odd or Even: Determine if the number is odd or even.

Positive or Negative: Determine if the number is positive or negative.

Magnitude Classification:

- **Single Digit:** If the absolute value of the number is a single-digit number.
- **Two Digits:** If the absolute value is a two-digit number.
- **Three or More Digits:** If the absolute value is a 3+ digit number.

The program should display the results for each entered number **AND** provide a summary at the end showing the count of odd and even numbers, positive and negative numbers, and the number of values in each magnitude classification.

Ensure the program utilizes a while loop to continuously accept user input until "DONE" is entered. Use if conditions, to classify each number.

Example INPUT AND OUTPUT:

```
Enter a number (DONE to exit): 8
Number: 8 is even, positive, and has a Single Digit magnitude.

Enter a number (DONE to exit): -15
Number: -15 is odd, negative, and has a Two Digits magnitude.

Enter a number (DONE to exit): 35
Number: 35 is odd, positive, and has a Two Digits magnitude.

Enter a number (DONE to exit): -724
```

```
Number: -724 is even, negative, and has a Three or More Digits
magnitude.

Enter a number (DONE to exit): DONE
Exiting the program...

Summary:
- Odd Numbers: 2
- Even Numbers: 2
- Positive Numbers: 2
- Negative Numbers: 2
- Single Digit Magnitude: 1
- Two Digits Magnitude: 1
- Three or More Digits Magnitude: 1
```

Question 3 - Calorie Tracker and Diet Planner

You are tasked with developing a Python program that helps users track their daily caloric intake, calculate their Body Mass Index (BMI), and plan a diet based on their recommended caloric needs.

1. BMI Calculation:

Ask the user to input their height (in meters) and weight (in kilograms).

Calculate the BMI using the formula: **BMI = weight / (height * height).**

2. Caloric Needs Calculation:

Based on the user's BMI, determine their daily caloric needs using the provided table (Table 1) with BMI categories, BMI values, and corresponding recommended calories.

Table 1: Recommended Daily Calories based on BMI

BMI Category	BMI Value	Recommended Calories
Underweight	< 18.5	2200
Normal Weight	18.5-24.9	2000
Overweight	25-29.9	1800
Obese	>= 30	1500

3. Diet Planning:

Provide the user with a list of foods, portions, and their respective calorie content (Table 2).

Table 2: Food, Portion, Calorie Content, and BMI Value

Food	Portion Size (grams)	Calories
Apple	100	52
Chicken Breast	150	165
Pasta	200	158
Avocado	50	80
Spinach	50	11

- Allow the user to choose various foods and specify the portion size for each.
- Calculate the total calories consumed based on the user's food choices.

4. Caloric Comparison:

- Compare the total calories consumed with the recommended daily calories.
- Display a message indicating whether the user has consumed more or less than the recommended calories.

Ensure the program utilizes functions, loops, and if conditions effectively to achieve the desired functionality.

Example Output:

```
Enter your height (in meters): 1.75
Enter your weight (in kilograms): 70

BMI Calculation:
Your BMI is 22.86, which falls into the Normal Weight category.

Caloric Needs Calculation:
Based on your BMI, your recommended daily calories are 2000.

Diet Planning:
Choose from the following foods (enter '0' when done):
1. Apple
2. Chicken Breast
3. Pasta
4. Avocado
5. Spinach

Enter the number of the food you want to eat (or 0 to finish): 1
Enter the portion size (in grams) for Apple: 150

Enter the number of the food you want to eat (or 0 to finish): 2
Enter the portion size (in grams) for Chicken Breast: 200

Enter the number of the food you want to eat (or 0 to finish): 0

Caloric Comparison:
You have consumed a total of 298 calories.

Result:
You have consumed fewer calories than the recommended daily intake.
```

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1. **For submissions, make sure you read the rubrics of the Assignment. Each part of your code has its own dedicated marks, from comments and coding standards to variable names, algorithms, and approaches. Make sure you read the rubrics to be aware of the details of the grading.**
2. **You can assume that all inputs are valid. For next assignments however, you need to validate the input.**