MTH 3300 Problem Set 1

Due date: February 9, 2025 11:59pm

For the first part, please type up your responses and submit it as a PDF.

For the programming assignment, please follow the following naming convention for your Python files.
`mth3300_<lastname>_<firstname>_pset1_part<#>.py`

So for example, the name of my three files for this problem set would be:

- `mth3300_abbariao_jaime_pset1_part1.py`
- `mth3300_abbariao_jaime_pset1_part2.py`
- `mth3300_abbariao_jaime_pset1_part3.py`

If you worked with someone for this assignment, please note who on the PDF!

What will the following statements output? (10 points)

1. `-3 ** 3`

```
-27
```

2. `0.1 + 0.3 == 0.4`

```
True
```

3.
```python
name = "Jeff"
age = 30

print(name + age)
```

```
TypeError: can only concatenate str (not "int") to str
```

4. `-10 % 3`

```
2
```

5.
```python
condition1 = False
condition2 = True

print(condition1 and condition2)
```

```
False
```

6.
```python
age = 0

print(not age)
```

```
True
```

7.
```python
some_condition = "False"
explicit_cast_to_bool = bool(some_condition)

print(not some_condition)
```

```
False
```

8. `6.3 // 2`

```
3.0
```

9.
```python
x = 10
y = 20

print(x < y and y > 15)
```

```
True
```

10.
```python
x = 5
y = 2

print((x + y) * 2 == 14)
```
```
True
```

The Local Store goes Digital

The local corner store, run by Mrs. Chen for 30 years, is finally going digital! She needs your help to build a simple calculator for her store. Let's help her step by step to modernize her beloved shop.

Part 1: The Basic Calculator (10 points)

Mrs. Chen wants to start simple. Every morning, customers come in to buy multiple items of the same product - like 6 apples or 3 loaves of bread. She's tired of calculating these by hand!

> **Since we haven't gone over decimal formatting yet, don't worry about having to output your result with 2 decimal places.**

Your Task: Create a program that helps Mrs. Chen:
- Enter the price of any item (like $2.50 for one apple)
- Enter how many of that item the customer wants
- See the total cost right away

For example, if someone wants 6 apples at $2.50 each, she should see $15.00 as the total.

Example output:

```
Enter the price: $2.50
Enter how many you want: 6
Total cost: $15.00
```

```python
price = float(input("Enter the price: $"))
qty = int(input("How many you want: "))
total_cost = price * qty

print(f"Total cost: ${total_cost}")
```

Part 2: Store Promotion Time! (30 points)

Exciting news! Mrs. Chen is running her first store-wide promotion. She wants to offer a 5% discount on everything and needs to account for the 8% sales tax that she has to charge.

Your Task: Help Mrs. Chen create a calculator that:
- Takes the item price and quantity like before
- Automatically applies the 5% discount to everything
- Adds the required 8% sales tax
- Shows a clear breakdown of the original price, discount, tax, and final price

She wants customers to see exactly how much they're saving!

Example output:

```
Enter the price: $2.50
Enter how many you want: 6
Original price: $15.00
Discount: $0.75
Tax: $1.14
Final price: $15.39
```

```python
price = float(input("Enter the price: $"))
qty = int(input("How many you want: "))
total_cost = price * qty

print(f"Original price: ${total_cost}")

print(f"Discount: ${total_cost * 0.05}")
discounted_price = total_cost * 0.95

print(f"Tax: ${discounted_price * 0.08}")
print(f"Final price: ${discounted_price * 1.08}")
```

Part 3: The Loyalty Program (50 points)

Mrs. Chen's daughter suggested starting a loyalty program with three tiers: Bronze, Silver, and Gold (represented as levels 1, 2, and 3). The higher the level, the more customers save! Each level gives an extra 5% discount (Level 1 = 5%, Level 2 = 10%, Level 3 = 15%). Plus, to keep things organized, there's a standard $10 delivery fee for all orders.

Your Task: Create the ultimate calculator that:
- Takes the item price and quantity
- Asks for the customer's loyalty level (0, 1, 2, or 3)
- Calculates their special loyalty discount
- Adds the delivery fee and sales tax
- Prints a detailed receipt showing every cost and saving

Mrs. Chen wants her customers to feel special and see all their loyalty rewards clearly laid out on the receipt!

Example output:

```
Enter the price: $2.50
Enter how many you want: 6
Original price: $15.00
Enter your customer loyalty level: 3
Discount: $2.25
Tax: $1.02
Delivery fee: $10.00
Final price: $23.77
```

```python
price = float(input("Enter the price: $"))
qty = int(input("How many you want: "))
total_cost = price * qty

print(f"Original price: ${total_cost}")

customer_level = int(input("Enter your customer loyalty level: "))

discount = 0.05 * customer_level

print(f"Discount: ${total_cost * discount}")
discounted_price = total_cost * (1 - discount)

print(f"Tax: ${discounted_price * 0.08}")

delivery_fee = 10.0

print(f"Delivery fee: ${delivery_fee}")
print(f"Final price: ${discounted_price * 1.08 + delivery_fee}")
```