Lab Assignment Week 03

CSC/DSCI 1301 – Principles of CS/DS I

Week of September 9th, 2024

Introduction

Welcome to the third programming lab of CSC/DSCI 1301! Today, we will be covering the following topics:

- Integer and floating-point arithmetic
- Precedence rules for arithmetic expressions
- Using the floor division operator
- Importing modules
- Using the Math and Random modules

Lab policy reminders:

- Attendance is mandatory.
- Labs must be completed **individually.**
- TAs are here to help you. Ask them for help!

Deliverables:

1. Python files for all three programs in the lab
2. Screenshots of program output for all three programs

If you have any questions, please do not hesitate to ask your TA!

Program 1: calories.py

For the first program in today's lab, you will need to write a program that estimates the average calories burned for a person when exercising. You will need to implement the following equation as a Python expression:

$$Calories = \frac{(Age \times 0.2757 + Weight \times 0.03295 + Heart\ Rate \times 1.0781 - 75.4991) \times Time}{8.368}$$
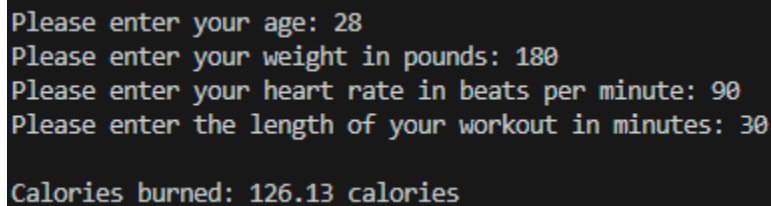
You will need to gather the following information from the user:

1. **Age** – The user's age in years
2. **Weight** – The user's weight in pounds
3. **Heart Rate** – The user's heart rate in beats per minute
4. **Time** – The length of the workout in minutes

Example Output

Your output should be formatted like the image below. The floating-point value must be formatted to display only two digits after the decimal point. See the Python statement below.

```
print(f'Calories burned: {calories:.2f}')
```

```
Please enter your age: 28
Please enter your weight in pounds: 180
Please enter your heart rate in beats per minute: 90
Please enter the length of your workout in minutes: 30

Calories burned: 126.13 calories
```

Skills Covered

- Integer and floating-point arithmetic
- Precedence Rules for Arithmetic Expressions

Deliverables

For this program, you will need to provide the Python file containing your code as well as a screenshot of the output of your program. Please name your files as follows:

- Python Files
    - lastname_firstname_filename.py
    - For example: **hawamdeh_faris_calories.py**
- Screenshots
    - lastname_firstname_filename.png
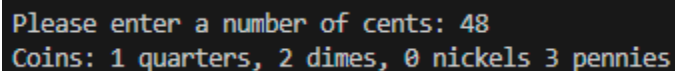   - For example: **hawamdeh_faris_calories.png**

Program 2: change.py

For your second program, you will write a program that converts a user-entered number of cents into the fewest number of US coins of that amount. US currency has four different types of coins: **quarters (25 cents), dimes (10 cents), nickels (5 cents), and pennies (1 cent)**. You will need to use the floor division operator to solve this problem. Your program must prompt the user to enter a number of cents in the terminal. Hint: Start with the largest denominations first!

The output of this program should be counts of each type of coin that represents this value. Your solution must be the fewest set of coins that equal the number of cents entered by the user.

Example Output

Your output should be formatted like the image below.

```
Please enter a number of cents: 48
Coins: 1 quarters, 2 dimes, 0 nickels 3 pennies
```

Skills Covered

- Using the floor division operator

Deliverables

For this program, you will need to provide the Python file containing your code as well as a screenshot of the output of your program. Please name your files as follows:

- Python Files
    - lastname_firstname_filename.py
    - For example: **hawamdeh_faris_change.py**
- Screenshots
    - lastname_firstname_filename.png
    - For example: **hawamdeh_faris_change.png**

Program 3: modules.py

For your third program, you will write a program that uses the constants and functions that are part of the Math and Random modules for Python. Your program will:

1. Calculate the volume of a Sphere.
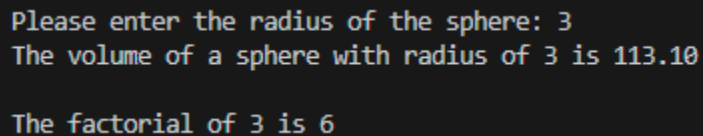2. Calculate the factorial of a randomly generated number between 1 and 10.

The formula for the volume of a sphere is shown below. **You must write a Python expression for the following equation using the pi constant and the pow() function in the Math module.**

$$Volume = \frac{4}{3}\pi r^3$$

Your program should ask the user to enter the radius of the sphere. To generate the random number between 1 and 10, you must use the randInt() function in the Random module. To compute the factorial of a number, you will need to use the factorial() function in the math module. The floating-point value must be formatted to display only two digits after the decimal point.

Example Output

Your output should be formatted like the image below.

```
Please enter the radius of the sphere: 3
The volume of a sphere with radius of 3 is 113.10

The factorial of 3 is 6
```

Skills Covered
- Importing modules
- Using the Math and Random modules

Deliverables

For this program, you will need to provide the Python file containing your code as well as a screenshot of the output of your program. Please name your files as follows:

- Python Files
    - lastname_firstname_filename.py
    - For example: **hawamdeh_faris_modules.py**
- Screenshots
    - lastname_firstname_filename.png
    - For example: **hawamdeh_faris_modules.png**