

# Lab Assignment Week 03

*CSC/DSCI 1301 – Principles of CS/DS I*

*Week of January 27<sup>th</sup>, 2025*

## 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!

## Comments

The lab assignment requires the inclusion of comments to enhance code readability and understanding. Specifically, a block comment at the beginning of the Python file is required. Your block comment should include the following:

- The program name
- The author's name (your name)
- A description of the program's overall purpose

Additionally, inline comments should be used throughout the code to explain specific lines or sections that might be less obvious to someone reading the code. These inline comments can clarify complex calculations, explain the purpose of certain variables, or provide additional context for specific code blocks.

## 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:

$$\text{Calories} = \frac{(\text{Age} \times 0.2757 + \text{Weight} \times 0.03295 + \text{Heart Rate} \times 1.0781 - 75.4991) \times \text{Time}}{8.368}$$

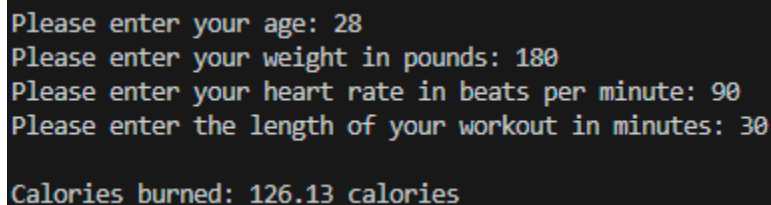
You will need to gather the following information from the user:

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. This will require using *f-strings* in your `print()` functions. See the Python statement below.

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

A screenshot of a terminal window with a dark background and light-colored text. It shows the program's prompts and user input for age, weight, heart rate, and workout time, followed by the calculated calories burned.

```
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**

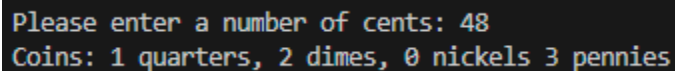
## Program 2: change.py

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! Subtract the value of the previous denomination before calculating the next.**

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

- Integer Arithmetic
- 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.**

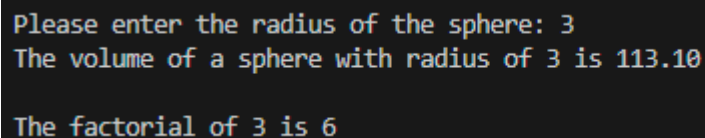
$$Volume = \frac{4}{3}\pi r^3$$

Your program should prompt the user to enter the radius of the sphere, calculate the volume of the sphere, and print the result into the terminal. The floating-point value must be formatted to display only two digits after the decimal point. This will require using **f-strings** in your **print()** functions.

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.

### Example Output

Your output should be formatted like the image below.

A screenshot of a terminal window with a dark background and light-colored text. It shows three lines of output: 'Please enter the radius of the sphere: 3', 'The volume of a sphere with radius of 3 is 113.10', and 'The factorial of 3 is 6'.

```
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**