

# CSE 1321L: Programming and Problem Solving I Lab

## Assignment 1 – 100 points

### Solving Problems

#### What students will learn:

- 1) Problem solving
- 2) Terminology
- 3) Basic program structure
- 4) Input and output with the user
- 5) Basic calculations and those calculations requiring an intermediate solution

**Overview:** For most of you, this will be the first time you've done any programming, which is exciting! The write-up of this first assignment will be a little longer than others because we want you to have an understanding of how things are going to roll out the rest of the semester. Advice: Start early (certainly not the day the assignment is due), practice, and ask a lot of questions.

Unless calculations are trivial, you'll almost always want to use an intermediate variable – where you store part of the solution. For example, you might remember the equation for gravity as:

$$F = G \frac{m_1 * m_2}{R^2}$$

How would you write this as code? You might solve it in parts instead of one shot because it makes it easier to check. It would look something like:

```
temp1 = m1 * m2
temp2 = r * r
temp3 = temp1/temp2
f1 = g * temp3
```

**Final note: don't cheat.** If your temptation is to look online, don't. Come see us instead and ask questions – we're here to help. Remember, you're going to have to write code in your future job interviews, so learn it now in order to secure a high-paying job later.

### Assignment 1A:

**Construct a Mailing Address:** A mailing address is composed of different parts. For this assignment, you will prompt the user to give you values for the name, street address, city, state, and zip code. Then, you will combine them and print out the formatted mailing address.

### **For Example:**

John Doe  
1234 Elm Street  
Atlanta, GA 30301

Save your source code in a file called **Assignment1A.py**

### Output:

[Let's create a mailing address!]

Name: **John Doe**  
Street Address: **1234 Elm Street**  
City: **Atlanta**  
State: **GA**  
Zip Code: **30301**

Your mailing address is:

**John Doe**  
**1234 Elm Street**  
**Atlanta, GA 30301**

## Assignment 1B:

### Loan Payment Calculator

You're applying for a car loan and want to calculate your monthly payment. The monthly payment can be calculated using the formula:

$$\text{Monthly Payment} = \frac{P \times r \times (1 + r)^n}{(1 + r)^n - 1}$$

Where:

- P is the loan amount (principal).
- r is the monthly interest rate (annual interest rate divided by 12 and converted to a decimal).
- n is the number of payments (loan term in years multiplied by 12).

Write a Python program that prompts the user for the loan amount, annual interest rate, and loan term in years. The program should calculate and display the monthly payment.

1. Prompt the user to enter the loan amount (principal) as a floating-point number.
2. Prompt the user to enter the annual interest rate as a floating-point number.
3. Prompt the user to enter the loan term in years as an integer.
4. Calculate the monthly interest rate by dividing the annual interest rate by 12 and converting it to a decimal (e.g., if the annual rate is 5%, convert it to 0.05 and then to 0.004167 for monthly rate).
5. Calculate the number of payments by multiplying the loan term in years by 12.
6. Use the formula to calculate the monthly payment.
7. Display the monthly payment, rounded to two decimal places.

### Output:

```
Enter the loan amount: 25000  
Enter the annual interest rate (in %): 5.5  
Enter the loan term (in years): 5  
Your monthly payment is: $477.52
```

## Assignment 1C:

### **Body Mass Index (BMI) Calculator**

Body Mass Index (BMI) is a measure of body fat based on height and weight. The formula to calculate BMI is:

$$\text{BMI} = \frac{\text{weight (kg)}}{(\text{height (m)})^2}$$

Write a Python program that prompts the user for their weight in kilograms and height in centimeters. The program should calculate the user's BMI and categorize it into one of four categories: Underweight, Normal weight, Overweight, or Obesity.

### **BMI Categories:**

- **Underweight:** BMI less than 18.5
- **Normal weight:** BMI between 18.5 and 24.9
- **Overweight:** BMI between 25 and 29.9
- **Obesity:** BMI 30 or above

### **Instructions:**

1. Prompt the user to enter their weight in kilograms as a floating-point number.
2. Prompt the user to enter their height in centimeters as a floating-point number.
3. Convert the height from centimeters to meters by dividing the height by 100.
4. Calculate the BMI using the formula and round it to one decimal place.
5. Assign a number (1 to 4) to the BMI category using arithmetic operations:
  - Category 1 represents Underweight.
  - Category 2 represents Normal weight.
  - Category 3 represents Overweight.
  - Category 4 represents Obesity.
  - Use arithmetic to assign the correct category number based on the BMI value.
6. Output the BMI value and the corresponding category number.

**Hint:** You can use arithmetic operations to combine boolean expressions (True/False) and convert them into numerical values that correspond to the different BMI categories.

### Output:

```
Enter your weight in kilograms: 70
Enter your height in centimeters: 175
Your BMI is: 22.9
You are classified as: 2 weight
```

**Submission:**

1. You will submit 3 separate files – one for each of the assignments above.
2. Upload separate files (one for each assignment) to the assignment submission folder in Gradescope. Do NOT submit homework in D2L.
3. Submit your work by the due date.