

## Assignment 1 - I/O stream and control statements (variables, operators, if-else, switch-case statement)

Deadline: Oct. 1st  
Individual Assignment  
Weight: 4%

**Submission instructions:**

- Create a cpp file for each question
- Create a pdf file containing the screenshot of all programs and their results. Save the pdf file and all .cpp files in a folder
- Name the file as your lastname\_student id
- Compress the files using zip or other tools and name the file as your lastname\_student id
- Submit the zip file on Moodle
- Do not submit executable files
- All submissions must be done through **Moodle**

<b>Your Information:</b>
First Name: Adam
Last Name: Limam
Student ID: 40319843
Grade:
<b>Expectations of originality:</b>
Paste the signed form here or submit it as a separate file with this assignment:

**Questions:**

1. **(15 marks)** Write a C++ program that asks the user to input two integers. The program will then:
- 1) Print whether the first number is divisible by the second number or not.
  - 2) Print whether the second number is divisible by the first number or not.
  - 3) Compute and display the absolute difference between the two numbers.
  - 4) Compute and display the result of dividing the first number by the second number and the remainder.

*The output should look like this:*

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```
Enter the first number: 15
Enter the second number: 6
15 is not divisible by 6.
6 is not divisible by 15.
The absolute difference between the two numbers is 9.
The result of dividing 15 by 6 is 2 with a remainder of 3.
```

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2. **(10 marks)** Write a code in C++ to calculate the following formula:

$$x = x + \frac{-y + 4x}{2z} - \frac{x * \text{sqrt}(y) + 6}{4}$$

Using the initial values of x=2, y=2, and z=3.

**(35 marks)** You are tasked with building a **tax bracket calculator** that computes the **tax** based on the user's **annual salary**. The tax system is **progressive**, meaning different portions of the salary are taxed at different rates. Additionally, there are **deductions** that vary based on the salary range.

*Task:*

Write a C++ program that:

1. Asks the user to input their **annual salary**.
2. Applies the following **tax brackets**:
  - If the salary is **less than \$10,000**, there is **no tax**.
  - If the salary is **between \$10,000 and \$20,000**, tax is **10%** of the salary above \$10,000 with a **\$500 deduction**.
  - If the salary is **between \$20,001 and \$50,000**, tax is **\$1,000** for the first \$20,000 plus **20%** of the amount above \$20,000, with a **\$1,000 deduction**.
  - If the salary is **between \$50,001 and \$100,000**, tax is **\$7,000** for the first \$50,000 plus **30%** of the amount above \$50,000, with a **\$500 deduction**.
  - If the salary is **above \$100,000**, tax is **\$22,000** for the first \$100,000 plus **40%** of the amount above \$100,000, with **no deduction**.
3. Ensure that the **tax** is never negative (e.g., when deductions exceed the calculated tax).
4. Print the following:
  - The user's **salary**.
  - The calculated **tax**.
  - The **salary after tax**.

**3.** *The output should look like this:*

\*\*\*\*\*

**Example1:**

```
Enter your annual salary: 10000
Salary: $10000.00
Tax: $0.00
Salary after tax: $10000.00
```

**Example2:**

```
Enter your annual salary: 25300
Salary: $25300.00
Tax: $1060.00
Salary after tax: $24240.00
```

**Example3:**

```
Enter your annual salary: 155000
Salary: $155000.00
Tax: $44000.00
Salary after tax: $111000.00
```

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- 4. (20 marks)** Write a C++ program that calculates the shipping cost for a package based on its weight and dimensions (length, width, and height). The program will:
- 1) Ask the user to input the package weight (in kilograms) and the package dimensions (length, width, and height in centimeters).

- 2) The shipping cost is calculated based on both **the actual weight** and the **dimensional weight** (**dimensional weight** is computed as volume of the package divided by 5000).
- 3) The user is charged based on the greater of the actual weight and the dimensional weight:
  - If the greater weight is less than or equal to 2 kg, the cost is \$5.
  - If the greater weight is between 2 kg and 10 kg, the cost is \$10.
  - If the greater weight is between 10 kg and 20 kg, the cost is \$20.
  - If the greater weight is greater than 20 kg, the package is too heavy, and the program should display a message indicating that it cannot be shipped.

*The output should look like this:*

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```
Enter the package weight in kilograms: 3
Enter the package dimensions (length, width, height) in
centimeters: 60 40 30
The dimensional weight is 12.00 kg.
The shipping cost is $20.
```

```
Enter the package weight in kilograms: 1.5
Enter the package dimensions (length, width, height) in centimeters: 20 10 5
The dimensional weight is 0.20 kg.
The shipping cost is $5.
```

```
Enter the package weight in kilograms: 25
Enter the package dimensions (length, width, height) in centimeters: 60 50 40
The dimensional weight is 24.00 kg.
The package is too heavy to be shipped.
```

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5. (20 marks) Write a C++ program that converts a given value from one unit of measurement to another. The program will prompt the user to enter a value and then select one of the following conversion options using a number:
- 1) Convert from Kilometers to Miles (1 kilometer = 0.621371 miles)
  - 2) Convert from Pounds to Kilograms (1 pound = 0.453592 kilograms)
  - 3) Convert from Celsius to Fahrenheit (Fahrenheit = Celsius  $\times$  9/5 + 32)
  - 4) Convert from Liters to Gallons (1 liter = 0.264172 gallons)

Based on the user's selection, the program should perform the corresponding conversion and display the result. If the user enters an invalid option, the program should display an error message.

*The output should look like this:*

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```
Enter the value you want to convert: 100
Select the conversion:
1. Kilometers to Miles
2. Pounds to Kilograms
3. Celsius to Fahrenheit
4. Liters to Gallons
Enter your choice (1-4): 1
100 kilometers is equal to 62.14 miles.
```

Enter the value you want to convert: 50

Select the conversion:

1. Kilometers to Miles
2. Pounds to Kilograms
3. Celsius to Fahrenheit
4. Liters to Gallons

Enter your choice (1-4): 5

Invalid selection. Please choose a valid option (1-4).

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