CS1580 - Introduction to Programming Lab (FS2024)
Lab 2

Lab Objectives

In this lab, you will be implementing the following topics:

- Basic primitive types
- Arithmetic operations
- Constants
- Static type casting

Lab Task: Gravitational Force between Two Bodies

Based on Newton's Law of Universal gravitation, the gravitational force between two bodies is given as:

$$\text{Gravitational Force} = \text{Gravitational Constant} * \frac{\text{Mass of First Body} * \text{Mass of Second Body}}{\text{Distance} * \text{Distance}}$$

Write a program the gravitational force using the above formula. Takes the user inputs for the following:

- Mass of First Body (integer)
- Mass of Second Body (integer)
- Distance (integer)

Constraints

Please make sure your program meets the following constraints.

- Declare "Gravitational Force" as a constant
- Name your variables appropriately. These are NOT proper names: "variable1", "info", "a", "b".
- Do necessary type casting if necessary

  The syntax for static type casting is as followed:

```
float PI = 3.1416
static_cast<int> (PI) // the value is now 3
```

- Make sure your program successfully passes the following test cases

	Test case 1	Test case 2	Test case 3
Mass of first body	1	2	30
Mass of second body	5	3	30
Distance	2	7	30
Gravitational Force on planet X	7.924	6.79645	7.674

Sample input/output

```
Welcome to the Gravitational Force Calculator!!
Input the mass of first body: 30
Input the mass of second body: 30
Input the distance: 30
Computed gravitational force in planetX is: 7.674
```

Compiling multiple files

Use the following command: `fg++ lab2.cpp`

Gitlab Cloning Instructions

- Open the browser and go to https://git-classes.mst.edu/. Click on the Lab2 repository named *2024-FS-303-Lab2-<your_username>*
- Click on 'Clone' button and copy the HTTPS link.
- Open Putty and
    - Change the directory to SDRIVE: `cd SDRIVE`
    - Clone the repository: `git clone <copy_the_HTTPS_link_here>`
    - Change the directory to cloned repository: `cd 2024-FS-303-<your_username>`
- Start coding by opening a new file in nano: `nano lab2.cpp`

Compiling Instructions

- To run your code, `fg++ *.cpp`
- To get the output, `./a.out`

Submission Instructions

Push your code to your gitlab account.

- Add all your files to the repository, `git add .`
- Commit your changes, `git commit -m "<your_message_goes_here>"`
- Push the changes, `git push`