Lab Assignment 1
Basic Arithmetic and I/O

COL 100

8 March 2021

First Mantra

Don't forget the semicolons in C; however, don't add them randomly.

1 Arithmetic on two numbers

Write a program to take 2 numbers from the user and perform the following operations.
i) addition ii) subtraction iii) multiplication iv) division v) modulus
Note: Modulus is the operation to find the signed remainder of a division of two integers. For example, 42 mod 4 = 2 and -4 mod 3 = -1

Print the result of each operation as an output.

Take care of the cases like division by zero, adding two very large signed and unsigned integers. Understand what happens in these and other invalid input cases by discussing them in your lab session and among team members. Finally, implement some **checks** to take care of these cases as necessary and print relevant errors. Understand the relative pros and cons of checking inputs and outputs in your program

2 Reverse the Number

Write a program to take 4 digit number as input from the user and reverse the number. Print the reversed number as output and also **check** whether the obtained reversed number is a valid 4 digit number or not.
In the output, the 1st line should contain the reversed number and the 2nd line should contain Valid/Invalid as per the validity of the obtained reversed number.

2.1 Example

2.1.1

Input:

```
3456
```

Output:

```
6543
Valid
```

2.1.2

Input:

```
4320
```

Output:

```
234
Invalid
```

3 Volumes of Solids

Design a program to calculate the volume of cuboid, cylinder and sphere.
Input:

- In line 1, l w h parameters for cuboid
- In line 2, r h parameters for cylinder
- In line 3, r parameter for the sphere

Output: Print volumes of each in a separate line. (1st output for cuboid, 2nd line for cylinder, 3rd for sphere)
Restrict the output to 2 decimal places and take pi = 3.14159265

Example

Input:

```
2 3 4.1
5 6
9
```

Output:

```
24.60
471.24
3053.63
```

4 Roots of Quadratic Equation

Consider the quadratic equation $ax^2 + bx + c$, you are given coefficients $a, bandc$ as inputs, find and print the roots of the quadratic equation as output.
If given coefficients does not form a quadratic equation, print "Not a Quadratic Equation" as output
Input: 3 values for a, b, c in a single line separated by spaces
Output: Roots for quadratic equation
$D = b^2 - 4ac$
If $D < 0$ output both roots separated by space
If $D = 0$ output single root
If $D < 0$ print "No Real Roots" as output
Restrict output to 3 decimal places

4.1 Example

4.1.1

Input:

```
2 5 -3
```

Output:

```
-3.000 0.500
```

4.1.2

Input:

```
1 1 12
```

Output:

```
No Real Roots
```

5 Size of data types

Print the size of data types - int, float, bool, char and double on your device and understand the maximum value limits of data types.

6 Grading Scheme

Given marks of the course for a student, follow the below grading scheme and print the corresponding grade as output. Constraints: 0 $\leq$marks$\leq$ 100 and marks$\in$R
86 - 100: A+
71 - 85: A-
56 - 70: B+
41 - 55: B-
26 - 40: C
0 - 25: F

Example:

Input:

```
84.25
```

Output:

```
A-
```

7 Regular Polygon

Given the number of sides, n of a regular polygon, calculate the interior angle. Write a check on whether the given number is valid for constructing the regular polygon, else print "Invalid Input" as output.

Example:

Input

```
4
```

Output

```
90
```

8 Minutes Passed

Given the time in 24-hour format, calculate the minutes passed from midnight. For time 16:20, the input will simply be 1620; based on it check whether the input is a valid 24-hour time or not. In case the input is not valid, print "Invalid Input" as output. input∈N and output∈N

8.1 Example

8.1.1

Input:

```
1620
```

Output:

```
980
```

8.1.2

Input:

```
1670
```

Output:

```
Invalid Input
```

8.1.3

Input:

```
3045
```

Output:

```
Invalid Input
```

9 A Shopping Bill

Two products, sweater and shoes are on sale. Given the initial price, discount in percentage and tax in percentage on the products, calculate the final bill after buying both the products.
Inputs will be given in two lines in the format initial price, discount, tax
Check whether the inputs are valid or not i.e. price should be greater than zero, tax and discount should be in the range 0-100. Constraints: Input∈ R+ and an output ∈ R+
If inputs do not follow these constraints, print "Invalid Input" as output. Restrict output to 2 decimal places

9.1 Example

9.1.1

Input:

```
1000 10 10
1200 15 10
```

Output:

```
2112.00
```

9.1.2

Input:

```
1400 5 18
-2100 12 15
```

Output:

```
Invalid Input
```

Submission and other logistics

Submit at least 5 code solutions(.c files of 5 questions) as a zip file on gradescope. **Additionally** also attach screenshots in the same submission showing the execution of your code on your terminal with outputs for some inputs. You can also submit all 9 questions to increase your chances of full/5 marks.
Example: To zip folder 'a1' as 'a1.zip':

```
zip -r a1.zip a1
```

It is highly **recommended** that you name the code files and variables in those code files with proper names as per the question to easily identify them. Comments in your codes are also highly **encouraged** and makes life easier for everyone.
You can check **2nd Chapter** in NASA's C style guide for styling recommendations

You can work either individually or with another student of your group for the assignment.
only one submission on gradescope is enough for a team but you need to **add your teammate** on gradescope after submission.
Follow these steps for adding your team member
Note: you can change your team for future assignments