North South University - Spring 2023
Course: CSE225L Assessment: Lab HW 1
Marks: 15 Submission Time: 1 week

General Instructions:

- Follow the lab submission process given on Canvas.
- You can take help from the internet for the logic part. But don't practice plagiarism.
- Strictly follow the submission deadline and try to solve all problems by yourself.

Problem List:

1. Write a program that reads the radius of a circle from the user and prints its area and perimeter using the following formula and format the output (up to 2 decimal points).

[Hint: Perimeter = 2 * radius * PI, Area = radius * radius * PI]

2. Write a program that reads two integers a, b from the user and prints all perfect numbers between them. You must write a user-defined function **int isPerfect(int x)** that determines if a number is perfect or not.

[Hint: A perfect number is a positive integer that is equal to the sum of its positive divisors, excluding the number itself. For instance, 6 has divisors 1, 2 and 3, and 1 + 2 + 3 = 6, so 6 is a perfect number.]

3. Print the following patterns: (any one)

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4. For example, you did 4 courses last semester and received grades as follows: CSE115 (3 credits, A-), CSE115L (1 credit, A), MAT120 (3 credits, A-), MAT125 (3 credits, B+).

Check NSU grading policy for calculating your CGPA. [Hint: The CGPA is calculated by multiplying the overall grade score by the credit score of each subject by the total credit scores.]

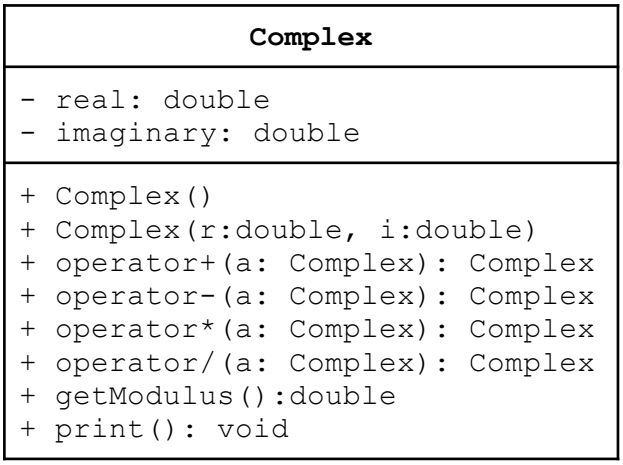
Write down a program that reads credit hours and earned grade points for N courses and prints the final CGPA for that semester. You must use the concepts of dynamic memory allocation and array to implement the logic here.

5. Design a class named Rectangle that supports class template and contains:

- Two private properties: length and width
- A no-arg constructor that creates a default Rectangle
- A constructor that creates a Rectangle with the specified property values
- The accessor and mutator methods for all properties
- A method named print() that shows all the properties
- A method named getArea() that returns the area of a Rectangle
- A method named getPerimeter() that returns the perimeter of a Rectangle

(a) Draw a UML diagram based on the given case study.
(b) Convert the UML diagram into codes (Rectangle.h, Rectangle.cpp)
(c) Write down a test program (main.cpp) that creates two instances of Rectangle class for int and double data types respectively. Then print the properties, area and perimeter for each instance.

6. Complete the following tasks.



(a) Convert the UML diagram into codes (Complex.h, Complex.cpp).
(b) Write down a test program (main.cpp) that creates two instances of Complex class and prints their modulus and complex format respectively.
(c) Perform overloaded addition, subtraction, multiplication and division operations on created two complex instances and print their modulus and complex format respectively.