CL-103

Computer Programming

Lab # 11 Sec B

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| Objectives:  * Exception Handling * Templates |

**Note: Carefully read the following instructions (***Each instruction contains a weightage***)**

1. There must be a block of comments at start of every question's code; the block should contain brief description about functionality of code
2. Use three files format (i.e header and cpp files).
3. Proper indentation of code is essential
4. Variable name should be meaningful
5. Make a Microsoft Word file and past all of your C++ code with screenshot of outputs in MS word.
6. First think about statement problems and then write/draw your logic on copy.
7. After copy pencil work, code the problem statement on MS Studio C++ compiler.
8. At the end when you done your today lab tasks, attached only MS word file and make your submission on slate.
9. Late and email submission is not accepted. All tasks must be submitted during the lab time.

 **Problem 1: Exceptions caught based on exception types**

1. Write a simple program using function that throws an exception if divide by zero occur and catch the exception in main.
2. Write a program to throw and catch the following type of exceptions:
   1. Integer
   2. Float
   3. String
   4. Character

Write one try block and appropriate specific catch block/s.



**Problem 2: Exceptions caught.**

Write a program that prompts the user to enter a length in feet and inches and outputs the equivalent length in centimeters. If the user enters a negative number or a non-digit number, throw and handle an appropriate exception and prompt the user to enter another set of numbers.

**Problem 3: Fraction calculator using Exception.**

Write a program that lets the user perform arithmetic operations on fractions. Fractions are of the form a/b, a is **numerator** and b, in which a and b are integers and b! = 0. Your program must be menu driven, allowing the user to select the operation (+, -, \*, or /) and input the numerator and denominator of each fraction.

Furthermore, your program must consist of at least the following functions:

1. **Function menu:** This function informs the user about the program’s purpose, explainshow to enter data, and allows the user to select the operation.
2. **Function addFractions:** This function takes as input four integers representing thenumerators and denominators of two fractions, adds the fractions, and returns the numerator and denominator of the result.
3. **Function subtractFractions**: This function takes as input four integers representing thenumerators and denominators of two fractions, subtracts the fractions, and returns the numerator and denominator of the result**Function multiplyFractions:** This function takes as input four integers representing the numerators and denominators of two fractions, multiplies the fractions, and returns the numerators and denominators of the result.
4. **Function divideFractions:** This function takes as input four integers representing thenumerators and denominators of two fractions, divides the fractions, and returns the numerator and denominator of the result.

Code the above problem such that your program handles Exceptions such as division by zero and invalid input.

**Problem 4: Defining your own exception.**

Define your own exception. Name your Exception class as named Myexception, override the public method provided by the exception class named as what() in your exception class which should return the cause of the exception.

Now use this the exception you made in a program which divides two numbers and throws an exception of type Myexception in case of “**a/0”** and in the catch part you should give the output message of the exception class you have created.

**Problem 5: Function Template** 

Write a simple C++ program for addition and multiplication using function template.

Write functions Add () and Mul () in your program.

From main() pass the different data types values to functions using function calls:

1. Add(int ,int )
2. Add(float,float)
3. Add(double,double)
4. Mul(int,int)
5. Mul(float,float)
6. Mul(double,double)

**Problem 6: Class Templa****te**

Find the area of Triangle using class Template.

Define a class Triangle having methods:

1. Area()
2. Perimeter()

Done the following tasks:

1. Pass the length and width of triangle.
2. Fine the area and perimeter of Triangle containing the following function calls:
   1. Area(int,int)
   2. Area(float,float)
   3. Area(int,float)
   4. Area(float,double)
   5. Area(double,int)
   6. Area(float,double)
   7. Area(double,double)
3. And same for the perimeter.

**Hints:**

* Triangle A= 12(LxW)
* Perimeter P= (L+W+H)

**Problem 7: Function and Class Template** 

Write a C++ class Calculator. Write the function templates for the following functions of

Calculator class:

1. Addition of two numbers
2. Subtraction of two numbers
3. Multiplication of two numbers
4. Division of two numbers

5. SquareRoot (use built in function sqrt() or sqrtf())

Write out of line definitions for the above mentioned functions.

These functions can possibly take these types of arguments:

* Integers
* Floats

1. Addition (int , int )
2. Addition (int , float )
3. Addition (float , int )
4. Division (int, int)
5. Division (float , int )
6. Division (int , float)
7. SquareRoot(int)
8. SquareRoot(float)

**Good Luck! ☺**

**You are done with your exercise(s), attached all files and make your submission in slate [MS-word + program files Screenshot].**