Bachelor of Technology Partnership

C++ Programming – ENG TECH 1CP3
Functions

Lab L3

For each of the following problems, be sure to output the results to the console.

1. Write a program that will prompt the user for a title (store the title in a variable of type string) from within the main function. Add a second function to the program that will accept this string as a parameter and will print the title on a line and then underline the title with the equal sign ('=') for the length of the string. Use the length() function of the string data type within the function to determine the number of characters in the string. Remember to include the function prototype, the function and the function call.

2. A measure of the inelasticity of a collision is the coefficient of restitution CR, defined as the ratio of relative velocity of separation to relative velocity of approach. In applying this measure to ball sports, this can be easily calculated using the following formula:

$$C_{\mathrm{R}} = \sqrt{\frac{\text{bounce height}}{\text{drop height}}}.$$

   Write a function called calculateCR that will accept two parameters of type double (bounce height and drop height) and then calculate the coefficient of restitution and return the value to the calling function (main). If either parameter is less or equal to 0 or the bounce height is greater than the drop height return a value of -1.0 from the function. In all other cases perform the calculation and return the value. From within the main function, prompt the user for the two input values and then call the calculateCR function. Print the coefficient of restitution to the screen to 3 decimal places. If the function returns -1 print an error message.

3. Write a function that accepts three integer numbers as parameters and returns the number closest to 0. If two or three values are the same distance from 0 return the first number of the three parameters that is closest to 0. For example:
   a. int closest = findClosest(-5, 5, -3); would return -3 as the closest value.
   b. int closest = findClosest(10, 1, -1) would return 1 as the closest value.
   c. int closest = findClosest(-12, 12, 12) would return -12 as the closest value.

   Complete this problem by writing a program that will call the function in a loop until the user enters three 0's.

Optional: Complete this problem by writing a program that will read data from a data file until it reads a line with three 0's. The data below should be put into a data file that your program will read. Call the data file "LAB3DATA.TXT"

```
23 43 -10
65 1 -1
-3 3 3
400 401 -389
21 6 -6
0 0 0
```

Note:- Indicate the units for all I/O values required from- or provided to- the user.

Create a Word .doc file that contains the source code and a screen captures of the console window as the program is running, for all 3 problems. Save this file as YourName_Lab_3.doc and upload and submit to the appropriate AVENUE lab drop-box.