SFWR TECH 3PR3
Functions, References & Pointers

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). Add a function to the program that will accept this string 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. Write a program that will prompt the user for the two input values and then call the 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 returns that accepts three integer numbers and returns the number closest to 0. If two or three values are the same distance from 0 return the first number 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.

4. Write a void function named read2Values that will prompt the user to enter two double values greater than 0. If either value is less or equal to 0 the function must repeat the request for the two values. Once the two values are entered the function must return both

values to the calling function (main) using pointer (reference) variables and then the two values must be printed in main to the console. The function prototype is shown below:

```
void read2Values(double *v1, double *v2);
void read2Values(double &v1, double &v2);
```

5. Write a boolean function called calculateBox will return both the volume and surface area of a box with dimensions of length, width and height in units of cm. The function must accept the three input dimension for the box and return both the volume and surface area using pointer variables. If any of the dimensions is less or equal to 0 the function should return false through the use of the return statement. If the values are greater than 0 the function must return true.

   Write a main function that will prompt the user to enter the dimensions of the box and then call the function. If the function returns true than print both the Volume and Surface area of the box. If the function returns false, print an error message to the screen.

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