COSC-1436, Lab Assignment 5

Submit your answers to the following questions in a word processing document that is compatible with Microsoft Word. The name of the file you submit should be "**XYLab5**", where "**X**" and "**Y**" are your first and last initials.

Questions (50 points):

1. Compose a C++ `for` loop that displays only the even integer values starting with three and ending with nineteen. Provide all the code needed to execute your answer if it were included as part of a complete program.

2. Compose a C++ `while` loop that allows the user to enter a number. The number should then be multiplied by eight, and the result assigned to a variable named `product`. The loop should continue to repeat prompting the user to enter a number, multiplying it by eight and assigning that value to the variable named `product` while the value of `product` is less than 81.

3. Compose the C++ code that prompts the user to enter a number in the range from 21 through 79, validates the input, and then displays the validated entry. (Refer to section 5.3 of the textbook for information and examples on using the `while` loop for input validation.)

4. Convert the C++ `do-while` loop in the following code to an equivalent C++ `for` loop:

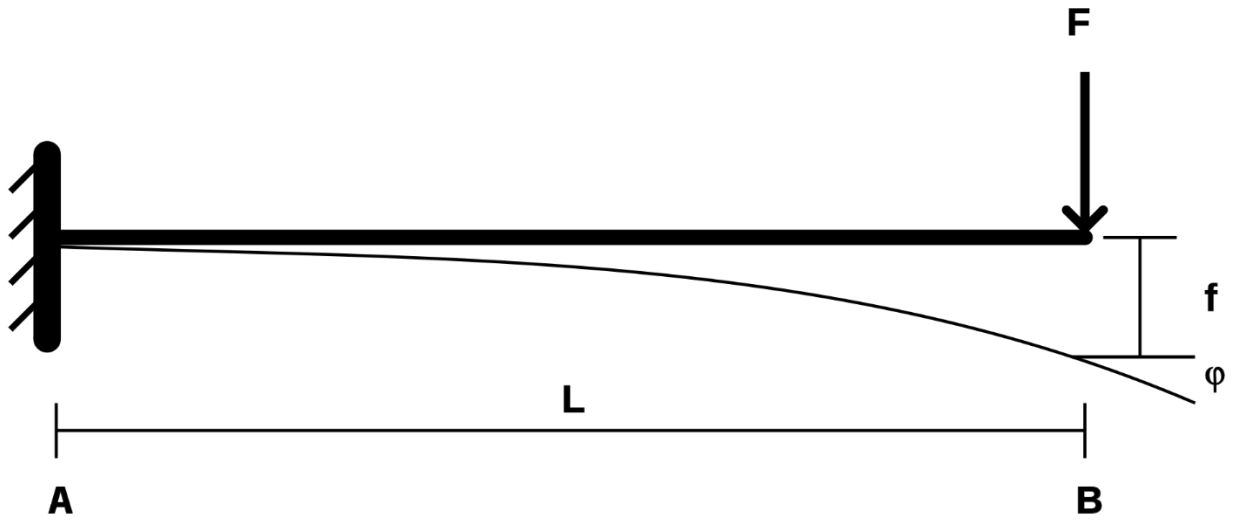
```
int count = 7;
do
{
    cout << "The value of count is " << count << endl;
    count = count + 3;
} while (count < 75);
```

5. How many times will the following loop iterate?

```
for (int count = -1, i = 17; count <= i; count += 3)
    cout << "count = " << count << endl;
```

Programming Exercise:

Beam Deflection



Use the following formula to determine beam deflection at any point x along the length of the beam:

$$d = \frac{Fx^2}{6EI}(3L - x)$$

Where:

E is Young's modulus of elasticity. (Use a value of 210.)
I is the Area moment of inertia. (Use a value of 500.)
L is the length of the beam in feet.
F is the weight Force exerted at the end of the beam in pounds.

Use the following formula and the assumed values above to determine the maximum deflection which will occur at the end of the beam:

$$d_{max} = \frac{FL^3}{3EI}$$

Write a C++ program that prompts the user for the length of the beam and the weight load at the end of the beam.

Your program will display the deflection of the beam at 1-foot intervals from the wall anchoring the beam for each foot from the wall until the end of the beam. The program will also calculate and display the maximum deflection.

Example Output:

```
Enter the Beam Length: 10
     Enter the Weight: 500
The deflection at  1 feet is  0.0230
The deflection at  2 feet is  0.0889
The deflection at  3 feet is  0.1929
The deflection at  4 feet is  0.3302
The deflection at  5 feet is  0.4960
The deflection at  6 feet is  0.6857
The deflection at  7 feet is  0.8944
The deflection at  8 feet is  1.1175
The deflection at  9 feet is  1.3500
The deflection at 10 feet is  1.5873
Maximum deflection is  1.5873
```

Your program must include a comment statement that contains your full name.

You must solve this problem using only the material that has been presented so far in the course. At this point, we have covered Chapters 1 through 5.

Submit two files. A word processing file with your answers to the five Questions and the source code file containing your solution to the Programming Exercise. Remember to submit both files at the same time.

