ECE 449/590 – Object Oriented Programming and Machine Learning

HOMEWORK #1
Due date: Thursday, September 25, 2025, 11:59 PM

Note: Submit a single PDF that includes all answers to the questions below (including codes).

1. **(10 points)** Compile and run the program below A and B. Write a C++ style output function (printing on the screen) to show the data in message. Are these definitions valid? Why or why not? Explain your answer along with the screenshot of your output and your code. You can utilize VSCode from your VM.

    A.

    ```
    const std::string hello = "Hello";
    const std::string message = hello + ", world" + "!";
    ```

    B.

    ```
    const std::string exclaim = "!";
    const std::string message = "Hello" + ", world" + exclaim;
    ```

2. **(10 points)** The assignment operator = works with two operands L and R in the form L=R. For the following code to generate an output of 3 3 3 3, what should be the associativity of = and what should be the result and the side effects of L=R? Confirm your answer by executing the below program in C++, provide the screenshot of your code and result to back up your answer.

    ```
    int a(0), b(1), c(2), d(3);
    a=b=c=d;
    std::cout << a << " " << b << " " << c << " " << d << std::endl;
    ```

3. **(10 points)**

    A. The following program attempts to copy from u into v. Explain why this is an incorrect method.

    ```
    std::vector<int> u(10, 100);
    std::vector<int> v;
    std::copy(u.begin(), u.end(), v.begin());
    ```

    B. Correct the above program. There are at least two possible ways to correct the program but you are only required to implement one.

4. **(20 points)** Suppose you have a std::vector<int> temp = { 1, 2, 3, 4, 5 }
    Write a short C++ program using iterator to print each element in this vector. Include a screenshot of your code and the output.

5. **(20 points)** Suppose integers are containers with int elements. Implement a function to sort integers from the largest to the smallest. Include a sample container to prove your program is working. Provide your code and screenshot of the output. (Hint: use std::sort.)

6. **(20 points)** Compile and execute hw1_q6.cpp (from Canvas).
    A. Write line-by-line comments to this program.
    B. Discuss the output of this program. Run it a couple of times. Try with different values of max_size. Take screenshots of your outcomes. Explain why vector/list is always faster than the other.