Lab 07: Input Validation

and other interesting problems

In this lab assignment, we are going to practice problems that use for and while loops so that we understand loops better and incorporate them in solving programs. For loops are well structured and easy to program. We can solve interesting problems with for loops. For example, the following for loop will execute end_loop number of times, where end_loop is any positive integer.

for (unsigned count=1; count<=end_loop; count ++) // for loop

{   // for loop body

}

In the above loop, if the value of end_loop variable is 5 then the loop will execute 5 times. If the value of the end_loop variable is 10 then the loop will execute 10 times and so forth. For loops are easier to adopt in solving problems. In this assignment we want to use for loops and while loops to solve the following problems:

1. Use a loop to calculate the factorial of n, where n is a positive
   integer number, n <=20.
   A. Input the value of n and make input validation. The value of
      n should be between 0 and 20 (inclusive).
   B. Calculate the factorial of n. For example, if n = 5 then the
      factorial of n can be calculated as, factorial = 5 * 4 * 3 *
      2 * 1
   C. By observing the equation we can understand that the problem
      can be easily solved by using a loop. For any value of n, we
      have to design a loop that iterates n times. If we use
      end_loop=n in the above loop, we can achieve that.
   D. Further, we can use the value of count and multiply that with
      an accumulator variable to obtain the factorial value as like
      the following, factorial = factorial * count;

2. Use a loop to calculate the power of X^n. Use input validation to
   input the values of X (X is a positive integer and X <=20).
   Similarly, use input validation to input the value of n (n is a
   positive integer and n<=10).
   A. For example, if X = 2 and n = 5 then the power can be
      calculated as, power = X * X * X * X * X, which is 32.

B. By observing the above equation we can easily deduce the loop in order to calculate the power value. For example, if the value of n = 5 then, we have to multiply X with itself 5 times.

C. In the above loop, if we use end_loop = n, then we have a loop that iterates 5 times. Further, we want to use an accumulator variable that will keep the running multiplication value like, power = power * X;

As evident, we need to write two programs to for this assignment. When you are satisfied with your programs, by the due date of 5pm Saturday, 7 March, submit them on the Blackboard website.