# Assignment 6

# Due: 6:00PM 10/13/23

**Purpose:** The purpose of this assignment is to allow you to gain some experience with using iterative **`do`** loops for summation and products as well as to force you to think about algorithms.

**Your goal:** Write a Fortran program that uses an iterative do loop to evaluate the sum

$$\sum_{i=0}^{N} \left( C_i \frac{x^{2i}}{(2i)!} \right)$$

where

$$C_i = \begin{cases} -1 & \text{if } i \text{ is odd} \\ 1 & \text{if } i \text{ is even} \end{cases}.$$

Your code should prompt the user to enter a real value for x > 0 and an integer value for N. It should also output the value of the sum to STDOUT. You may assume that N will be greater than or equal to zero and will small enough, i.e. N <= 6) such that (2i)! will always be computable without experiencing integer overflow.

To receive credit **your code should use only a single loop.** Note: any submissions that use more than one loop, or that use a **`do while`** or while loop, will receive a score of zero automatically!

**Hint:** Before you begin writing code think about the algorithm for computing the denominator of each term before you begin writing code. Once you have that algorithm worked out on paper, along with the algorithm for computing the sum, then you can start writing code!

**Challenge & Further Hint:** It is possible to complete this assignment without using any **`if`** constructs, **`if`** statements, or conditional constructs of any kind! You can receive full credit even if you use a conditional construct but for fun try to push yourself to figure out a way to do this efficiently to calculate this sum without using any conditionals! It may even be easier to code if you think of a way to do this problem without conditional constructs!

**Note:** Make sure that your submission conforms to the **Instructions for Source Code Submission** instructions and that you have followed all of the **Good Programming Tips** in the notes!