Assignment 10
Due: 6:00PM 11/17/23

Purpose: The purpose of this assignment is to gain experience in writing reusable software using modules, subroutines, user defined function subprograms, and double precision arithmetic.

Your goal: Convert your Simpson's Rule code (from Assignment 6) to use double precision for all real variables and constants.   You should also modify your code to use a subroutine to supply the limits of integration and a user defined function subprogram to evaluate the integrand as a function of x at each point within the subinterval as needed to evaluate Simpson's Rule (note: you should invoke the function subprogram three times with three different arguments. The subroutine and user defined function should be packaged in a module.   The subroutine and function subprogram for the integrand should be accessed via use association from the main program.   The main program should not contain any information that is specific to the integral being done (that should all be in the subprograms),   The code should compute the abscissas (x coordinates) directly (see examples in the Lecture notes) as opposed to incrementing the location of the abscissas. The integral you should do is the same integral that was done in Assignment 7)

   Do not create three different function subprograms! For simplicity package all of your code in one file. Finally repeat the convergence study you did and note, in comments in the header block, how the converged value you find for the integral compares to the value you found using single precision reals in Assignment 6.   Note in the header block comments what the best value you obtained for the integral was, how many subintervals were needed to achieve convergence.

Hint: When you package all program units in the same file make sure that the module is at the top of the file above the main program as modules must be compiled before program units that access them can be compiled.   You should verify that your code is working correctly by testing it on an integrand where the integral can be done analytically. Once you are sure the code is working correctly then swap in the integrand and limits from Assignment 7 and carry out the convergence test.

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!