Trapezoid Method Programming Assignment
Numerical Analysis

Goal: Create a project which, given a function and an interval $a \leq x \leq$, uses the Trapezoid Method to approximate the integral of f over $a \leq x \leq b$.

Steps to follow - in this order:

1. Download the Trapezoid Method template and open the programming project:

   - Navigate to https://github.com/pattiscot/Numerical-Analysis-Student-Ready.git
   - Click the green "code" button and select "Download file"
   - Unzip the folder and open TrapezoidMethod. Simply double clicking the .zip file to open it will NOT suffice. It will not work properly in Visual Studio if you do this.
   - Double click the TrapezoidMethod.sln file. This should open the project in Visual Studio. Make sure to use version dotnet 8.0 for all your programs this semester.

2. Identify and inspect the interface.

   - You will find the Solution Explorer on the right hand side bar of Visual Studio. Use the Solution Explorer to find the interface which you need to implement. Recall that all interfaces are named with a leading capital I. So the interface in this project is a file named ITrapezoidMethod.cs. You should NOT make any changes to any of the interface classes (or other classes except the Programs.cs class and the class you create to implement the interface). However, you can inspect the interface to see what you are supposed to do in your implementation. You can open the interface (or any file in the Solution Explorer) by double clicking the name of the file in the Solution Explorer.

3. Add the implementation class to the project

   - Right click the name of the project (the bold name in the Solution Explorer) and select ADD and then in the sub-menu, select Class...
   - Select the class option and then, in the bottom area of this window pane, name the class Trapezoid-Method.cs
   - Click Add

4. Implement the methods specified in the interface

   (a) If the implementation class you just created does not automatically open then double click its name in the Solution Explorer to open it.
   (b) Replace the word internal with the word public. This changes the class to a public class which has greater accessibility within the project.
   (c) Setup the inheritance from ITrapezoidMethod.cs by adding :ITRapezoidMethod to the end of the line "public class TrapezoidMethod" like you learned to do in one of the tutorials.
   (d) Click the little light bulb - usually on the left hand side of the screen - and tell it to implement the interface. This should copy all the methods that I specified in the interface to your implementation and give you space to write your code.

5. Determine what you need to program by reading the interface.

   - Note that you should not make any changes to the getters and setters which are given near the top of your class.
   - Note that Trapezoid returns a double and accepts

     (a) double a which is the initial x_0 value
     (b) double b which is the final x_n value
     (c) Function f which accepts a double and returns a double
     (d) double MaxError which is the maximum error the user is willing to have in the calculation
     (e) double MaxSecondDerivative which is the maximum value of the second derivative over the interval $a \leq x \leq b$

1

6. You can use the Program.cs file for all your I/O. This can be used to help debug your program.

7. Submit your program

   - Create a zip file of your TrapezoidMethod.cs file.
   - Using the link to OICLearning posted on eclass, navigate to the Trapezoid Method assignment.
   - Submit this zip file on OICLearning. Wait a little while (up to a few minutes) to see your grade. You can resubmit as many times as you want until the deadline is passed. I will record the score from your last submission in the gradebook on eclass - so make sure that this is your highest score.