CMPT-439 Numerical Computation
Project 9

1. Design two functions (**50 points**)

   a) Utilizing the multiple application trapezoidal rule presented in the slides 13 and 30 of the Lecture 10 class notes (h and a function to be integrated given by a table should be transferred there using function arguments);

   b) Utilizing the composite Simpson's rule presented in the slides 23 and 30 of the Lecture 10 class notes (h and a function to be integrated given by a table should be transferred there using function arguments)

2. (**30 points**)

   Apply two functions designed above to integrate the function $f(x)$ given by the following table

x	$f(x)$
1.0	1.543
1.1	1.669
1.3	1.971
1.4	2.151
1.5	2.352
1.7	2.828
1.8	3.107

   a) Using the multiple application trapezoidal rule with $h_{small} = 0.1$

   b) Using the multiple application Simpson's 1/3 rule with $h_{small} = 0.1; n = 8$

   Use interpolation with a quadratic polynomial to find values of $f(x)$ at missing points **1.2** and **1.6**. Apply your **Lagrangian** function designed in **Project 7**.

3. (**15 points**) Ask a generative AI tool (ChatGPT or any other) to create two functions utilizing the multiple application trapezoidal rule and composite Simpson's rule for numerical integration using the same programming language, which you used. Give the AI tools an assignment to integrate the same function, which you needed to integrate in # 2. **Is AI-generated code correct? Was it able to integrate a function using both rules?**

4. (**5 points**) Write a brief report presenting your solution and demonstrating your understanding of this solution.