EMPossible

Reading

Textbook: *Numerical Methods for Engineers*, 7th Ed.
Steven C. Chapra & Raymond P. Canale
McGraw Hill

Website: https://empossible.net/academics/emp4301_5301/

Assignment: Read Chapters 21 & 22
Topic 6, Lectures 6a to 6e

Problem #1: Implement Numerical Integration

Download the function `crazyfunc(t)` from the course website and install it into MATLAB's working directory. Write a MATLAB program that performs discrete integration to integrate this function in the interval $-10 \leq x \leq 10$. Plot the function, highlight the region that is to be integrated by shading this region under the curve, and report the answer of the numerical integration on the plot accurate to exactly ten digits of precision (no more and no less). Be sure the plot is professional and of high quality. You will be graded heavily on the accuracy of your answer and the quality of your plot. Submit a signed graphics checklist with this assignment.

Problem #2: Perform a Convergence Study

With the program you have written in Problem #1, perform a convergence study on it and generate a professional plot of the results. Justify the number of rectangles needed to obtain ten digits of precision and identify convergence on the plot. Submit a signed graphics checklist with this assignment.

Problem #3: Visualize Numerical Integration

Visualize the numerical integration of the above function using 30 rectangles. At a minimum, your figure must show the function being integrated, the discrete points where the function values are known, the rectangles, and fill the areas of the integration leading to error with a highlighted color. You will be graded on the accuracy, completeness, and professional appearance of your figure. Choose axis limits that best showcases the numerical integration and everything in your plot. Submit a signed graphics checklist with this assignment.