Computational Methods in EE

Problem #1: Numerical Integration

Download `hw6func` from the course website and move the file into your working directory of MATLAB. This function works like all the other "`func`" functions we wrote in class except that you will call it as `hw6func()` instead of `func()`. It has three roots ($x = a$, b, and c) that lie somewhere in the interval $0 \le x \le 10$.

Part a

Determine the position of all the roots to within six digits of precision using the secant method. Report the roots with all significant digits.

Part b

Use numerical integration to evaluate the following integral to within six digits of precision using Simpson's 1/3 rule. The integration is from the first to the third root found in Part a of this homework. Report all significant digits of the answer and no more.

$$\int_a^c \text{hw6func}(x)\,dx$$

Part c

Discuss how many discrete points you used to perform the numerical integration and justify why you used that many.

Part d

Visualize the numerical integration of the above function using exactly five discrete points in the interval $a \le x \le c$. At a minimum, your figure must show the function being integrated, the discrete points where the function values are known, the polynomial being integrated at every three adjacent points, the regions of the integration leading to error, and the values of x and *hw6func*(x) of each point. You will be graded on the accuracy, completeness, and professional appearance of your figure. Choose axis limits that best showcases Simpson's 1/3 rule. Submit a signed graphics checklist with this assignment.