

Problem Set 13

Consider the definite integral $I = \int_{-1}^1 (t^3 + 1) dt$.

- a) Estimate I with $n = 4$ steps using the trapezoidal rule, find an upper bound for $|E_T|$ and evaluate the integral directly to find the exact value of $|E_T|$.

- b) Estimate I with $n = 4$ steps using Simpson's rule, find an upper bound for $|E_S|$ and evaluate the integral directly to find the exact value of $|E_S|$.

- c) Estimate the minimum number of subintervals needed to approximate the above integral with an error of magnitude less than 10^{-4} by the trapezoidal rule.

- d) Estimate the minimum number of subintervals needed to approximate the above integral with an error of magnitude less than 10^{-4} by Simpson's rule.