

Read BF Chapter 4.3, 4.4, 4.5

Exercises

Chapter 4.3 # 15

Chapter 4.4 # 1ae*, 3ae*, 11, 26b*

* You probably want to perform these calculations with Matlab. Also, note Problem B.

Chapter 4.5 # 1b

Problem A : The error for the Trapezoid Rule is approximately double the error for the Midpoint Rule, and has opposite sign. So, if you double the midpoint approximation and add that to the trapezoid approximation, you should get an approximation with smaller error. What formula results when you do this?

Problem B : For the integrals in 4.4#1ae, 3ae, find a bound on the error of your approximations.

Problem C : Use Romberg integration to compute $\ln 2 = \int_1^2 \frac{1}{x} dx$. Do three levels (compute R_{33} , as the book would say). Try to do it entirely by hand, and compare to Homework 1 Prob. A.

MATLAB/Octave

- (a) Compute the exact value of $\int_0^1 \frac{4}{1+x^2} dx$, using the Fundamental Theorem of Calculus.
- (b) Compute the integral using the composite trapezoid rule with $h = .1$, $h = .01$, $h = .001$ and find the error in each case. How does changing h by a factor of $\frac{1}{10}$ affect the error in the approximation?
- (c) Compute the integral using the composite Simpson's rule with $h = .1$, $h = .01$, $h = .001$ and find the error in each case. How does changing h by a factor of $\frac{1}{10}$ affect the error in the approximation?