

Quadrature Assignment Sections 6.4 & 6.5

Page 465 (do the problems in the order listed.)

#9 This problem needs hand calculations; do not use approximations to $\frac{\sqrt{3}}{3}$, do things exactly.

#6 For part (a) use $f = 1, x, x^2$ and the definition of degree of precision to set up a system of equation to solve for the coefficients. Express the coefficients as rational numbers. Then for part (b) you can use the constructive result from part (a) to shorten the search for the degree of precision.

Using Composite Quadrature

Dr. Hill's problem: We want to approximate $\int_0^1 \frac{1}{\sqrt{1+x^4}} dx$ using the COMPOSITE Trapezoidal rule,

Simpson's rule, and Midpoint rule. For the sake of comparison we want to use the same value of the h in each program (in MATLAB **trap**, **simp**, **midpt**). These programs are written so that you enter a function formula f , interval of integration a to b and n , the number of times the basic rule integration rule, will be used. For **trap** $h = \frac{b-a}{n}$, while for **simp** and **midpt** $h = \frac{b-a}{2n}$. For $h = 0.05$

determine the appropriate value of h for each method. Use each of the programs to approximate this integral.

On Page 479 do Exercise #4. Here you will need to make several approximations using program **simp** with appropriate choices of n (see the table below). You need to use **simp** to complete the columns labeled $S_h(f)$ and then apply formula in Exercise #3(b) page 479 to estimate the rate of convergence of the Simpson Estimates $S_h(f)$ in the last column.

n	h	$S_h(f)$	$\frac{S_h(f) - S_{h/2}(f)}{S_{h/2}(f) - S_{h/4}(f)}$
2	1/2	1.10947570824873	
4	1/4	1.11136323226389	16.083250
8	1/8		
16	1/16		
32	1/32		
64	1/64		