AMSC/CMSC 466 Dr. Wolfe ASSIGNMENT #5 Due November 22, 2004

1. Consider the integrals (from the last assignment).

$$\text{(a)} \quad \int_0^1 \sqrt{9+x^2}\, dx \qquad \text{(b)} \quad \int_0^1 x^{1/4}\, dx$$

The exact value of the integral in (a) is 3.05466450615185. Use Gauss-Legendre integration with $n = 2, 4, 8$ nodes on the integrals of problem 1. Compare the results with those for the trapezoidal and Simpson methods.

2. Use the MATLAB function QUADL to find approximate values of the integrals 1(a) and 1(b).

3. We wish to estimate the value of

$$I = \int_0^\infty x^{1/2} e^{-x}\, dx = \frac{1}{2}\sqrt{\pi}$$

   (a) Truncate the integral and use QUADL on the finite part.
   (b) Try the transformation $x = -\ln t$ on this integral and use QUADL on the new integral. (QUADL will complain but will do it).
   (c) Use the 2, 4 and 8 point Gauss-Laguerre rules to estimate the integral. Compare your results with parts (a) and (b) above.

4. Ex. 7, p.215, *Atkinson & Han.* Note: $\log x$ means the natural logarithm.

5. Ex. 22, p.219, *Atkinson & Han.*

6. Ex. 1, part (a), p.241, *Atkinson & Han.*

7. Ex. 3, part (a), p.241, *Atkinson & Han.*

8. Ex. 6, p.241, *Atkinson & Han.* (We did part of this in class.)

9. Ex. 7, p.241, *Atkinson & Han.*