UMC-202
PROBLEM SET 4

(1) Use rectangular rule and midpoint rule to evaluate the integral

$$\int_1^5 \sqrt{1+x^2}\,dx$$

(2) Approximate the following integrals using the Trapezoidal rule and Simpson's rule.

    (a) $\int_0^{0.5} \frac{2}{(x-4)}\,dx$,

    (b) $\int_0^{\pi/4} e^{3x} sin(2x)\,dx$.

(3) Use the Composite Trapezoidal rule and Composite Simpson's rule with the indicated values of n to approximate the following integrals

    (a) $\int_{-2}^2 x^3 e^x\,dx,\ \ n=4$.

    (b) $\int_0^{3\pi/8} tan(x)\,dx\ \ n=8$.

(4) Evaluate the following integral by using one point Gauss quadrature and compute the true error.

$$\int_0^{\pi/4} x^2\ sinx\ dx$$

(5) Redo Problem 11 by using two point Gauss quadrature formula.

(6) Use Composite Simpson's rule with $n=4$ and $m=2$ to approximate

$$\int_{1.4}^{2.0} \int_{1.0}^{1.5} \ln(x+2y)\,dy\,dx.$$

(7) Redo Problem 6 using the Gaussian quadrature formula with $n=1$, $m=2$ in both dimensions.