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) Redo Problem 1 by using the Trapezoidal rule.

(3) Use Simpson's rule to find an approximate value of the integral

$$\int_4^6 \frac{1}{3-\sqrt{x}}\ dx$$

(4) Use Simpson rule to evaluate
   (a) $\int_0^{\pi/3} cos^2x\ dx$.

   (b) Use your answer to part (a) to deduce an approximate value of integral $\int_0^{\pi/3} sin^2x\ dx$.

(5) Evaluate the integral $\int_0^4 (x^2 + cosx)\ dx$ by using midpoint formula.

(6) Approximate the integral of f(x)=x^3 on the interval [1,2] by using composite trapezoidal method

   (a) with four sub intervals,
   (b) with eight sub intervals,
   (which approximation is much closer to the correct answer).
   (c) Compute the true error in both the cases.

(7) Redo Problem 6 by using composite Simpson's rule.

(8) Using Trapezoidal Rule and Simpson's rule with n=4 to approximate the value of the following integral and compute the true errors and approximation errors

$$\int_0^2 e^{x^2}\ dx.$$