Department of Mathematical and Computational Sciences
National Institute of Technology Karnataka, Surathkal
Numerical Analysis - MA 704
Problem Sheet 6

Dr. P. Sam Johnson (nitksam@gmail.com) http://sam.nitk.ac.in/

1. Use the data of the following table to find the integral from $x = 1.6$ to $x = 3.4$ and estimate the error of integration using trapezoidal rule. The data are for $f(x) = e^x$.

x	1.6	1.8	2.0	2.2	2.4	2.6	2.8	3.0	3.2	3.4	3.6	3.8
$f(x)$	4.953	6.050	7.389	9.025	11.023	13.464	16.445	20.086	24.533	29.964	36.598	44.701

2. Evaluate
$$\int_0^2 e^x dx$$
using trapezoidal rule using $1, 2, 4$ and 8 subintervals.
Extapolate to the limit using Romberg integration.

3. Using Romberg's integration method, evaluate
$$\int_0^1 \frac{dx}{1+x}$$
correct to 3 decimal places.

4. Use Romberg integration (successive extrapolation with h halved each time) to evaluate
$$\int_1^2 \frac{dx}{x}.$$
Carry six decimals and continue until no change in the fifth place occurs. Compare to the analytical value
$$\log 2 = 0.6935.$$

5. Compute the integral
$$I = \int_5^{12} \frac{dx}{x}$$
using three term Gaussian formula.

6. Evaluate the value of
$$\int_1^2 e^x dx$$
by Gaussian method with $n = 3$.

7. Compute
$$\int_0^1 \frac{dx}{\sqrt{x^4+1}}$$
by Gauss's method, taking $n = 5$.