

Lab 6 –

Aim: Numerical evaluation of integrals using Simpson's method

Brief Theory: C program for Simpson 1/3 rule for easy and accurate calculation of numerical integration of any function which is defined in program. In the source code, a function $f(x)$ has been defined. The calculation using **Simpson 1/3 rule in C** is based on the fact that the small portion between any two points is a parabola. The program follows the following steps for calculation of the integral.

Numerical Procedure:

1. Define $f(x)$
2. Enter the values of lower and upper limit of x , i.e. x_0 and also enter number of intervals, N (N should be even number)
3. $h = (x_n - x_0)/N$
4. $sum = 0$
5. do
6. {
7. $sum = sum + (h/3) \cdot [f(x_0) + 4f(x_0 + h) + f(x_0 + 2h)]$
8. $x_0 = x_0 + 2h$
9. } while ($x_0 < x_n$)
10. print sum
11. stop

Examples:

i. Approximate $\int_2^3 dx / (x + 1)$ using Simpson's Rule with $n=4$.

ii. Compute the integral $\int_0^1 e^{x^2} dx$ by Simpson's rule.

iii. Calculate the value of $\int_0^{\pi/2} \sin x dx$ using 11 ordinates.