SIMPSON'S 1/3 RULE

Basic Concept

Simpson's 1/3 Rule is a numerical integration method used to approximate the definite integral:

$$\int_a^b f(x)\, dx$$

It approximates the curve using **parabolic arcs**.

Conditions

- Number of subintervals n must be **even**
- Step size:

    h=(b-a)/n

Formula

$$\int_a^b f(x)\, dx \approx \frac{h}{3}\Big[f(x_0) + f(x_n) + 4(f(x_1) + f(x_3) + \ldots) + 2(f(x_2) + f(x_4) + \ldots)\Big]$$

Algorithm

1. Divide the interval [a,b] into an even number of subintervals.
2. Calculate the step size h .
3. Evaluate the function at all points.
4. Apply Simpson's 1/3 formula.
5. Obtain the approximate value of the integral.

Advantages

• More accurate than Trapezoidal Rule
 • Simple and efficient for smooth curves

Applications

Widely used in physics, engineering, and numerical analysis.