

SIMPSON'S 3/8 RULE

Basic Concept

Simpson's 3/8 Rule is a numerical integration technique that approximates the integral using **cubic polynomials** over three subintervals.

Conditions

- Number of subintervals n must be a **multiple of 3**
- Step size:

$$h = (b - a) / n;$$

Formula

$$\int_a^b f(x) dx \approx \frac{3h}{8} \left[f(x_0) + f(x_n) + 3(f(x_1) + f(x_2) + f(x_4) + f(x_5) + \dots) + 2(f(x_3) + f(x_6) + \dots) \right]$$

Algorithm

1. Divide the interval into subintervals that are multiples of 3.
2. Calculate step size h .
3. Evaluate the function at all required points.
4. Apply Simpson's 3/8 formula.
5. Compute the approximate integral.

Advantages

- Higher accuracy for certain functions
- Useful when the number of intervals is a multiple of 3

Applications

Used in advanced numerical integration problems.