Simpson's 3/8 Rule

Theory:

Simpson's 3/8 Rule is an extension of Simpson's method that uses a third-degree polynomial over three consecutive subintervals.

The formula for Simpson's 3/8 Rule is

$$\int_{a}^{b} f(x)\, dx \approx \frac{3h}{8} [y_0 + y_n + 3(y_1 + y_2 + y_4 + y_5 + \cdots) + 2(y_3 + y_6 + \cdots)]$$

While Simpson's 3/8 Rule is generally slightly less accurate than Simpson's 1/3 Rule for the same step size, it remains an important alternative in numerical integration due to its flexibility in interval selection.