
Integration (Mathematics: 2-unit)

Trapezoidal Rule

$$\int_a^b f(x)dx \approx \frac{1}{2}h(f(a) + f(b) + 2 \times f(\text{between})) \quad [\text{Note: This is not a formal definition.}]$$

where $h = \frac{b-a}{n}$.

Simpson's Rule

$$\int_a^b f(x)dx \approx \frac{h}{3}(y_0 + y_n + 2(y_2 + y_4 + \dots) + 4(y_1 + y_3 + \dots))$$

Four Odd Two Even

Indefinite Integrals

$$\int x^n dx = \frac{x^{n+1}}{n+1} + c \quad \text{Note that } n \neq -1$$

Increase the power by 1 and then divide by the *new* power.

$$\int (ax+b)^n = \frac{(ax+b)^{n+1}}{a(n+1)} + c \quad \text{Note that } n \neq -1$$

Increase the power by 1 and then divide by the *new* power and the coefficient of x . It only works for linear expressions inside the brackets.

Definite Integrals

$$\int_a^b f(x)dx = [F(x)]_a^b = F(b) - F(a)$$

where $F(x)$ is the primitive of $f(x)$.