

Formulae You May or May Not Need

Selected Trigonometric Identities

$$\sin A \cos B = \frac{1}{2} [\sin(A - B) + \sin(A + B)]$$

$$\sin A \sin B = \frac{1}{2} [\cos(A - B) - \cos(A + B)]$$

$$\cos A \cos B = \frac{1}{2} [\cos(A - B) + \cos(A + B)]$$

Selected Integration Formulae

$$\int \csc x \, dx = \ln |\csc x - \cot x| + C$$

Midpoint Rule

$$M_n = \Delta x [f(\bar{x}_1) + f(\bar{x}_2) + \cdots + f(\bar{x}_n)]$$

Trapezoidal Rule

$$T_n = \frac{\Delta x}{2} [f(x_0) + 2f(x_1) + 2f(x_2) + \cdots + 2f(x_{n-1}) + f(x_n)]$$

Simpson's Rule

$$S_n = \frac{\Delta x}{3} [f(x_0) + 4f(x_1) + 2f(x_2) + 4f(x_3) + \cdots + 2f(x_{n-2}) + 4f(x_{n-1}) + f(x_n)]$$

Error Bounds

$$|E_T| \leq \frac{K(b-a)^3}{12n^2}$$

$$|E_M| \leq \frac{K(b-a)^3}{24n^2}$$

$$|E_S| \leq \frac{H(b-a)^5}{180n^4}$$

where $|f^{(4)}(x)| \leq H$ and $|f''(x)| \leq K$ on $a \leq x \leq b$

Arclength

$$L = \int_a^b \sqrt{1 + [f'(x)]^2} dx$$

$$L = \int_c^d \sqrt{1 + [g'(y)]^2} dy$$

Surface Area

x-axis

$$S = \int 2\pi y ds$$

y-axis

$$S = \int 2\pi x ds$$

where

$$ds = \sqrt{1 + \left(\frac{dy}{dx}\right)^2} dx \text{ or } ds = \sqrt{1 + \left(\frac{dx}{dy}\right)^2} dy$$