Integral Applications

Area between two curves, integrating on the x-axis

$$A = \int_a^b [f(x) - g(x)]\,dx$$

Area between two curves, integrating on the y-axis

$$A = \int_c^d [u(y) - v(y)]\,dy$$

Disk Method along the x-axis

$$V = \int_a^b \pi[f(x)]^2\,dx$$

Disk Method along the y-axis

$$V = \int_c^d \pi[g(y)]^2\,dy$$

Washer Method**

$$V = \int_a^b \pi[(f(x))^2 - (g(x))^2]\,dx$$

Method of Cylindrical Shells

$$V = \int_a^b (2\pi x f(x))\,dx$$

Arc Length of a Function of x

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

Arc Length of a Function of y

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

Surface Area of a Function of x

$$\text{Surface Area} = \int_a^b \left(2\pi f(x)\sqrt{1 + (f'(x))^2}\right)\,dx$$