

$$\sin^2 \theta = \frac{1}{2} - \frac{1}{2} \cos 2\theta \qquad \cos^2 \theta = \frac{1}{2} + \frac{1}{2} \cos 2\theta$$

$$\sin 2\theta = 2 \sin \theta \cos \theta \qquad \cos 2\theta = \cos^2 \theta - \sin^2 \theta = 1 - 2 \sin^2 \theta = 2 \cos^2 \theta - 1$$

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

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

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

$$\sin(-\theta) = -\sin \theta$$

$$\cos(-\theta) = \cos \theta$$

$$\int \sec \theta \, dx = \ln |\sec \theta + \tan \theta|$$

$$\int \csc \theta \, dx = \ln |\csc \theta - \cot \theta|$$

$$f(x) = \sum_{n=0}^{\infty} \frac{f^{(n)}(a)}{n!} (x-a)^n$$

$$\frac{1}{1-x} = \sum_{n=0}^{\infty} x^n \qquad R = 1$$

$$e^x = \sum_{n=0}^{\infty} \frac{x^n}{n!} \qquad R = \infty$$

$$\sin x = \sum_{n=0}^{\infty} (-1)^n \frac{x^{2n+1}}{(2n+1)!} \qquad R = \infty$$

$$\cos x = \sum_{n=0}^{\infty} (-1)^n \frac{x^{2n}}{(2n)!} \qquad R = \infty$$

$$\tan^{-1} x = \sum_{n=0}^{\infty} (-1)^n \frac{x^{2n+1}}{(2n+1)} \qquad R = 1$$

$$\ln(1+x) = \sum_{n=0}^{\infty} (-1)^{n-1} \frac{x^n}{n} \qquad R = 1$$

$$(1+x)^k = \sum_{n=0}^{\infty} \frac{k(k-1)(k-2)\cdots(k-n+1)}{n!} x^n = 1 + kx + \frac{k(k-1)}{2!} x^2 + \frac{k(k-1)(k-2)}{3!} x^3 + \cdots \qquad R = 1$$

$$\text{If } \sum_{n=m}^{\infty} ar^n \text{ converges, then } \sum_{n=m}^{\infty} ar^n = \frac{ar^m}{1-r}$$

$$\lim_{n \rightarrow \infty} \left(1 + \frac{1}{n}\right)^n = \left(\frac{n+1}{n}\right)^n = e$$

$$\lim_{n \rightarrow 0} (1+n)^{1/n} = e$$

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

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

$$\int_{\alpha}^{\beta} y(t)x'(t) \, dt$$

$$\begin{aligned} x &= r \cos \theta \\ y &= r \sin \theta \end{aligned}$$

$$r^2 = x^2 + y^2$$

$$\tan \theta = \frac{y}{x}$$

$$\frac{dy}{dx} = \frac{r \cos \theta + r' \sin \theta}{-r \sin \theta + r' \cos \theta}$$

$$\int_{\alpha}^{\beta} \frac{1}{2} [r(\theta)]^2 \, d\theta$$

$$\int_{\alpha}^{\beta} \frac{1}{2} ([r_o(\theta)]^2 - [r_i(\theta)]^2) \, d\theta$$

$$\frac{d}{dx} [\sin^{-1} x] = \frac{1}{\sqrt{1-x^2}}$$

$$\frac{d}{dx} [\sec^{-1} x] = \frac{1}{x\sqrt{x^2-1}}$$

$$\frac{d}{dx} [\tan^{-1} x] = \frac{1}{1+x^2}$$

$$\frac{d}{dx} [\cos^{-1} x] = \frac{-1}{\sqrt{1-x^2}}$$

$$\frac{d}{dx} [\csc^{-1} x] = \frac{-1}{x\sqrt{x^2-1}}$$

$$\frac{d}{dx} [\cot^{-1} x] = \frac{-1}{1+x^2}$$

$$\frac{d}{dx} [a^x] = \ln a \cdot a^x$$

$$\frac{d}{dx} [\log_a x] = \frac{1}{x \ln a}$$

$$\int a^x \, dx = \frac{a^x}{\ln a}$$

$$(f^{-1})'(a) = \frac{1}{f'(f^{-1}(a))}$$