

TABLE A6.4 *Trigonometric Identities*

$$\begin{aligned}
\exp(\pm j\theta) &= \cos \theta \pm j \sin \theta \\
\cos \theta &= \frac{1}{2}[\exp(j\theta) + \exp(-j\theta)] \\
\sin \theta &= \frac{1}{2j}[\exp(j\theta) - \exp(-j\theta)] \\
\sin^2 \theta + \cos^2 \theta &= 1 \\
\cos^2 \theta - \sin^2 \theta &= \cos(2\theta) \\
\cos^2 \theta &= \frac{1}{2}[1 + \cos(2\theta)] \\
\sin^2 \theta &= \frac{1}{2}[1 - \cos(2\theta)] \\
2 \sin \theta \cos \theta &= \sin(2\theta) \\
\sin(\alpha \pm \beta) &= \sin \alpha \cos \beta \pm \cos \alpha \sin \beta \\
\cos(\alpha \pm \beta) &= \cos \alpha \cos \beta \mp \sin \alpha \sin \beta \\
\tan(\alpha \pm \beta) &= \frac{\tan \alpha \pm \tan \beta}{1 \mp \tan \alpha \tan \beta} \\
\sin \alpha \sin \beta &= \frac{1}{2}[\cos(\alpha - \beta) - \cos(\alpha + \beta)] \\
\cos \alpha \cos \beta &= \frac{1}{2}[\cos(\alpha - \beta) + \cos(\alpha + \beta)] \\
\sin \alpha \cos \beta &= \frac{1}{2}[\sin(\alpha - \beta) + \sin(\alpha + \beta)]
\end{aligned}$$

TABLE A6.5 *Series Expansions*

Taylor series	$f(x) = f(a) + \frac{f'(a)}{1!}(x-a) + \frac{f''(a)}{2!}(x-a)^2 + \cdots + \frac{f^{(n)}(a)}{n!}(x-a)^n + \cdots$
where	$f^{(n)}(a) = \frac{d^n f(x)}{dx^n} \Big _{x=a}$
MacLaurin series	$f(x) = f(0) + \frac{f'(0)}{1!}x + \frac{f''(0)}{2!}x^2 + \cdots + \frac{f^{(n)}(0)}{n!}x^n + \cdots$
where	$f^{(n)}(0) = \frac{d^n f(x)}{dx^n} \Big _{x=0}$
Binomial series	$(1+x)^n = 1 + nx + \frac{n(n-1)}{2!}x^2 + \cdots, \quad nx < 1$
Exponential series	$\exp x = 1 + x + \frac{1}{2!}x^2 + \cdots$
Logarithmic series	$\ln(1+x) = x - \frac{1}{2}x^2 + \frac{1}{3}x^3 - \cdots$
Trigonometric series	$\sin x = x - \frac{1}{3!}x^3 + \frac{1}{5!}x^5 - \cdots$ $\cos x = 1 - \frac{1}{2!}x^2 + \frac{1}{4!}x^4 - \cdots$ $\tan x = x + \frac{1}{3}x^3 + \frac{2}{15}x^5 + \cdots$ $\sin^{-1}x = x + \frac{1}{6}x^3 + \frac{3}{40}x^5 + \cdots$ $\tan^{-1}x = x - \frac{1}{3}x^3 + \frac{1}{5}x^5 - \cdots, \quad x < 1$ $\text{sinc } x = 1 - \frac{1}{3!}(\pi x)^2 + \frac{1}{5!}(\pi x)^4 - \cdots$