

○ Trigonometric functions

$x$	0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$	$\frac{3\pi}{4}$	$\pi$	$\frac{5\pi}{4}$	$\frac{3\pi}{2}$	$\frac{7\pi}{4}$	$2\pi$	$3\pi$	$4\pi$	$n\pi$
$\sin(x)$	0	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$	+1	$\frac{1}{\sqrt{2}}$	0	$-\frac{1}{\sqrt{2}}$	-1	$-\frac{1}{\sqrt{2}}$	0	0	0	0
$\cos(x)$	+1	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	0	$-\frac{1}{\sqrt{2}}$	-1	$-\frac{1}{\sqrt{2}}$	0	$\frac{1}{\sqrt{2}}$	+1	-1	+1	$(-1)^n$

$$\sin^2 x + \cos^2 x = 1 \quad , \quad 1 + \tan^2 x = \sec^2 x \quad , \quad 1 + \cot^2 x = \csc^2 x$$

$$e^{ix} = \cos x + i \sin x \quad , \quad \cos(x) = \frac{1}{2}(e^{ix} + e^{-ix}) \quad , \quad \sin(x) = -i\frac{1}{2}(e^{ix} - e^{-ix})$$

$$\sin(a + b) = \sin a \cos b + \cos a \sin b \quad , \quad \sin(2a) = 2 \sin a \cos a$$

$$\cos(a + b) = \cos a \cos b - \sin a \sin b$$

$$\cos(2a) = \cos^2 a - \sin^2 a = 1 - 2 \sin^2 a = 2 \cos^2 a - 1$$

○ Indefinite Integrals (anti-derivatives)

$$\int x^n dx = \frac{x^{n+1}}{n+1} \quad , \quad n \neq -1 \quad , \quad \int \frac{dx}{x} = \ln|x|$$

$$\int \sin(ax) dx = -\frac{1}{a} \cos(ax) \quad , \quad \int \cos(ax) dx = \frac{1}{a} \sin(ax)$$

$$\int e^{ax} dx = \frac{1}{a} e^{ax} \quad , \quad \int \sin(x) \cos(x) dx = -\frac{1}{4} \cos(2x)$$

$$\int \sin^2(x) dx = \frac{1}{2}x - \frac{1}{4} \sin(2x) \quad , \quad \int \cos^2(x) dx = \frac{1}{2}x + \frac{1}{4} \sin(2x)$$

○ Definite Integrals ( $m, n$  are integers  $> 0$ )

$$\int_0^a \sin\left(\frac{m\pi x}{a}\right) \sin\left(\frac{n\pi x}{a}\right) dx = \frac{1}{2}a\delta_{mn} \quad , \quad \int_0^a \sin^2\left(\frac{m\pi x}{a}\right) \sin^2\left(\frac{n\pi x}{a}\right) dx = \frac{a}{8}[2 + \delta_{mn}]$$

$$\int_{-\infty}^{\infty} e^{-u^2/2} du = \int_{-\infty}^{\infty} u^2 e^{-u^2/2} du = \sqrt{2\pi} \quad , \quad \int_0^{\infty} u^n e^{-\alpha u} du = \alpha^{-n-1} n!$$

○ Miscellaneous

$$\nabla \cdot (a\mathbf{b}) = a(\nabla \cdot \mathbf{b}) + \mathbf{b} \cdot (\nabla a) \quad , \quad \nabla \times (a\mathbf{b}) = a(\nabla \times \mathbf{b}) + (\nabla a) \times \mathbf{b}$$

$$\det \begin{bmatrix} a & b \\ c & d \end{bmatrix} = ad - bc \quad , \quad \begin{bmatrix} a & b \\ c & d \end{bmatrix}^{-1} = \frac{1}{ad - bc} \begin{bmatrix} d & -b \\ -c & a \end{bmatrix}$$