

TRIGONOMETRIC IDENTITIES

$$\tan A = \sin A / \cos A$$

$$\sec A = 1 / \cos A$$

$$\operatorname{cosec} A = 1 / \sin A$$

$$\cot A = \cos A / \sin A = 1 / \tan A$$

$$\sin^2 A + \cos^2 A = 1$$

$$\sec^2 A = 1 + \tan^2 A$$

$$\operatorname{cosec}^2 A = 1 + \cot^2 A$$

$$\sin(A \pm B) = \sin A \cos B \pm \cos A \sin B$$

$$\cos(A \pm B) = \cos A \cos B \mp \sin A \sin B$$

$$\tan(A \pm B) = \frac{\tan A \pm \tan B}{1 \mp \tan A \tan B}$$

$$\sin 2A = 2 \sin A \cos A$$

$$\cos 2A = \cos^2 A - \sin^2 A$$

$$= 2 \cos^2 A - 1$$

$$= 1 - 2 \sin^2 A$$

$$\tan 2A = \frac{2 \tan A}{1 - \tan^2 A}$$

$$\sin 3A = 3 \sin A - 4 \sin^3 A$$

$$\cos 3A = 4 \cos^3 A - 3 \cos A$$

$$\tan 3A = \frac{3 \tan A - \tan^3 A}{1 - 3 \tan^2 A}$$

$$\sin A + \sin B = 2 \sin \frac{A+B}{2} \cos \frac{A-B}{2}$$

$$\sin A - \sin B = 2 \cos \frac{A+B}{2} \sin \frac{A-B}{2}$$

$$\cos A + \cos B = 2 \cos \frac{A+B}{2} \cos \frac{A-B}{2}$$

$$\cos A - \cos B = -2 \sin \frac{A+B}{2} \sin \frac{A-B}{2}$$

$$2 \sin A \cos B = \sin(A+B) + \sin(A-B)$$

$$2 \cos A \sin B = \sin(A+B) - \sin(A-B)$$

$$2 \cos A \cos B = \cos(A+B) + \cos(A-B)$$

$$-2 \sin A \sin B = \cos(A+B) - \cos(A-B)$$

$$a \sin x + b \cos x = R \sin(x + \phi), \text{ where } R = \sqrt{a^2 + b^2} \text{ and } \cos \phi = a/R, \sin \phi = b/R.$$

$$\text{If } t = \tan \frac{1}{2}x \text{ then } \sin x = \frac{2t}{1+t^2}, \cos x = \frac{1-t^2}{1+t^2}.$$

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

$$e^{ix} = \cos x + i \sin x ; \quad e^{-ix} = \cos x - i \sin x$$