Reciprocal Identities

$\tan\theta = \frac{\sin\theta}{\cos\theta}$ $\cot\theta = \frac{\cos\theta}{\sin\theta}$

$\mathrm{cosec}\,\theta = \frac{1}{\sin\theta}$ $\sin\theta = \frac{1}{\mathrm{cosec}\,\theta}$

$\sec\theta \equiv \frac{1}{\cos\theta}$ $\cos\theta \equiv \frac{1}{\sec\theta}$

$\cot \equiv \frac{1}{\tan\theta}$ $\tan\theta \equiv \frac{1}{\cot\theta}$

Pythagorean Identities

$\sin^2\theta + \cos^2\theta \equiv 1$

$\tan^2\theta + 1 \equiv \sec^2\theta$

$1 + \cot^2\theta \equiv \mathrm{cosec}^2\theta$

Double Angle Formula

$\sin 2\theta \equiv 2\sin\theta\cos\theta$

$\cos 2\theta \equiv \cos^2\theta - \sin^2\theta$
$\equiv 2\cos^2\theta - 1$
$\equiv 1 - 2\sin^2\theta$

$\tan 2\theta \equiv \frac{2\tan\theta}{1-\tan^2\theta}$

Odd/Even Formula

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

$\mathrm{cosec}(-\theta) = -\mathrm{cosec}(\theta)$ $\sec(-\theta) = \sec(\theta)$ $\cot(-\theta) = -\cot(\theta)$

$\sin(\frac{\pi}{2}-\theta) \equiv \cos(\theta)$ $\cos(\frac{\pi}{2}-\theta) \equiv \sin(\theta)$

$\tan(\frac{\pi}{2}-\theta) \equiv \cot(\theta)$ $\mathrm{cosec}(\frac{\pi}{2}-\theta) \equiv \sec(\theta)$

$\sec(\frac{\pi}{2}-\theta) \equiv \mathrm{cosec}(\theta)$ $\cot(\frac{\pi}{2}-\theta) \equiv \tan(\theta)$

Sum and Difference Formula

$\sin(\alpha \pm \beta) \equiv \sin\alpha\cos\beta \pm \cos\alpha\sin\beta$

$\cos(\alpha \pm \beta) \equiv \cos\alpha\cos\beta \mp \sin\alpha\sin\beta$

$\tan(\alpha \pm \beta) = \frac{\tan\alpha \pm \tan\beta}{1 \mp \tan\alpha\tan\beta}$

Sum to Product Formula

$\sin\alpha + \sin\beta \equiv 2\sin\left(\frac{\alpha+\beta}{2}\right)\cos\left(\frac{\alpha-\beta}{2}\right)$

$\cos\alpha + \cos\beta \equiv 2\cos\left(\frac{\alpha+\beta}{2}\right)\cos\left(\frac{\alpha-\beta}{2}\right)$

$\sin\alpha - \sin\beta \equiv 2\cos\left(\frac{\alpha+\beta}{2}\right)\sin\left(\frac{\alpha-\beta}{2}\right)$

$\cos\alpha - \cos\beta \equiv -2\sin\left(\frac{\alpha+\beta}{2}\right)\sin\left(\frac{\alpha-\beta}{2}\right)$

Product to Sum Formula

$\sin\alpha\sin\beta \equiv \frac{1}{2}[\cos(\alpha-\beta) - \cos(\alpha+\beta)]$

$\cos\alpha\cos\beta \equiv \frac{1}{2}[\cos(\alpha-\beta) + \cos(\alpha+\beta)]$

$\sin\alpha\cos\beta \equiv \frac{1}{2}[\sin(\alpha+\beta) + \sin(\alpha-\beta)]$

$\cos\alpha\sin\beta \equiv \frac{1}{2}[\sin(\alpha+\beta) - \sin(\alpha-\beta)]$

Differentiation of Trigonometric Functions

$\frac{d}{d\theta}(\sin\theta) = \cos\theta$ $\frac{d}{d\theta}(\cot\theta) = -\mathrm{cosec}^2\theta$

$\frac{d}{d\theta}(\cos\theta) = -\sin\theta$ $\frac{d}{d\theta}\ln|\sec\theta| = \tan\theta$

$\frac{d}{d\theta}(\tan\theta) = \sec^2\theta$ $\frac{d}{d\theta}\ln|\sec\theta + \tan\theta| = \sec\theta$

$\frac{d}{d\theta}(\mathrm{cosec}\,\theta) = -\mathrm{cosec}\,\theta\cot\theta$ $\frac{d}{d\theta}\ln|\sin\theta| = \cot$

$\frac{d}{d\theta}(\sec\theta) = \sec\theta\tan\theta$ $\frac{d}{d\theta}\ln|\mathrm{cosec}\,x + \cot x| = -\mathrm{cosec}\,x$