1.2: Trigonometric Identities

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Pythagorean Identities:

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

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

$\cot^2\theta + 1 = \csc^2\theta$

Angle Sum/Difference Identities:

$\sin(a \pm b) = \sin a \cos b \pm \cos a \sin b$

$\cos(a \pm b) = \cos a \cos b \mp \sin a \sin b$

$\tan(a \pm b) = \frac{\tan a \pm \tan b}{1 \mp \tan a \tan b}$

$\sin(a + b) + \sin(a - b) = 2 \sin a \cos b$

$\sin c + \sin d = 2 \sin(\frac{c+d}{2}) \cos(\frac{c-d}{2})$

$\sin c - \sin d = 2 \cos(\frac{c+d}{2}) \sin(\frac{c-d}{2})$

$\cos c + \cos d = 2 \cos(\frac{c+d}{2}) \cos(\frac{c-d}{2})$

$\cos c - \cos d = -2 \sin(\frac{c+d}{2}) \sin(\frac{c-d}{2})$

Double/Half Angle Identities:

$\sin 2\theta = 2 \sin\theta \cos\theta$

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

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