

**Basic Trigonometric Identities**

$$1. \sec \theta = \frac{1}{\cos \theta}, \quad \csc \theta = \frac{1}{\sin \theta}, \quad \cot \theta = \frac{1}{\tan \theta}.$$

$$2. \tan \theta = \frac{\sin \theta}{\cos \theta}, \quad \cot \theta = \frac{\cos \theta}{\sin \theta}.$$

$$3. \sin^2 \theta + \cos^2 \theta = 1, \quad 1 + \tan^2 \theta = \sec^2 \theta, \quad 1 + \cot^2 \theta = \csc^2 \theta.$$

**Sum and difference identities**

$$1. \sin(\theta \pm \phi) = \sin \theta \cos \phi \pm \cos \theta \sin \phi.$$

$$2. \cos(\theta \pm \phi) = \cos \theta \cos \phi \mp \sin \theta \sin \phi.$$

**Double-Angle Identities**

$$1. \sin 2\theta = 2 \sin \theta \cos \theta.$$

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

**Half-Angle Identities**

$$1. \sin^2 \theta = \frac{1}{2}(1 - \cos 2\theta).$$

$$2. \cos^2 \theta = \frac{1}{2}(1 + \cos 2\theta).$$

**Graphs of Trigonometric Functions**