

Trigonometric Identities

Below are the trig identities used in our course.

Pythagorean Identities:

$$\text{Sin/Cos: } \sin^2 A + \cos^2 A = 1$$

$$\text{Tan/Sec: } \tan^2 A + 1 = \sec^2 A$$

$$\text{Cot/Csc: } 1 + \cot^2 A = \csc^2 A$$

Alternative Pythagorean Identities:

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

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

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

$$\cot^2 A = \csc^2 A - 1$$

Negative Angle Identities:

$$\sin(-A) = -\sin A$$

$$\cos(-A) = \cos A$$

$$\tan(-A) = -\tan A$$

Sum and Difference Formulas:

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

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

$$\sin(A + B) = \sin A \cdot \cos B + \cos A \cdot \sin B$$

$$\sin(A - B) = \sin A \cdot \cos B - \cos A \cdot \sin B$$

$$\tan(A + B) = \frac{\tan A + \tan B}{1 - \tan A \cdot \tan B}$$

$$\tan(A - B) = \frac{\tan A - \tan B}{1 + \tan A \cdot \tan B}$$

Double Angle Formulas:

$$\sin(2A) = 2 \sin A \cdot \cos A$$

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

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

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

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

Half Angle Formulas:

$$\sin\left(\frac{1}{2}A\right) = \pm \sqrt{\frac{1 - \cos A}{2}}$$

$$\tan\left(\frac{1}{2}A\right) = \frac{1 - \cos A}{\sin A}$$

$$\cos\left(\frac{1}{2}A\right) = \pm \sqrt{\frac{1 + \cos A}{2}}$$

$$\tan\left(\frac{1}{2}A\right) = \frac{\sin A}{1 + \cos A}$$