## **Trigonometry Function Identities**

#### **Quotient Identities**

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

## **Pythagorean Identities**

$$sin2θ + cos2θ = 1$$
  

$$sec2θ - tan2θ = 1$$
  

$$csc2θ - cot2θ = 1$$

## **Cofunction Identities**

$$\begin{split} \sin\left(\frac{\pi}{2} - \theta\right) &= \cos\theta & \cos\left(\frac{\pi}{2} - \theta\right) &= \sin\theta \\ \tan\left(\frac{\pi}{2} - \theta\right) &= \cot\theta & \cot\left(\frac{\pi}{2} - \theta\right) &= \tan\theta \\ \csc\left(\frac{\pi}{2} - \theta\right) &= \sec\theta & \sec\left(\frac{\pi}{2} - \theta\right) &= \csc\theta \\ &\frac{\pi}{2} \text{ radians} &= 90^{\circ} \end{split}$$

#### **Double Angle Identities**

$$\sin(2\theta) = 2 \sin\theta \cos\theta$$

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

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

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

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

#### **Reciprocal Indentities**

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

#### **Even/Odd Indentities**

$$\sin(-\theta) = -\sin\theta$$
  $\cos(-\theta) = \cos\theta$   
 $\tan(-\theta) = -\tan\theta$   $\cot(-\theta) = -\cot\theta$   
 $\csc(-\theta) = -\csc\theta$   $\sec(-\theta) = \sec\theta$ 

#### **Sum/Difference Indentities**

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

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

$$\tan(\theta \pm \phi) = \frac{\tan\theta \pm \tan\phi}{1\mp \tan\theta \tan\phi}$$

### **Half Angle Indentities**

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

$$\cos\left(\frac{\Theta}{2}\right) = \frac{+}{\sqrt{\frac{1-\cos\Theta}{2}}}$$

$$\tan\left(\frac{\Theta}{2}\right) = \frac{+}{\sqrt{\frac{1-\cos\Theta}{1+\cos\Theta}}}$$

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

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

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Cofunction Identities	Sum/Difference Indentities
Double Angle Identities	Half Angle Indentities