

Section 5.6 Half Angle Identities

$$\cos \frac{A}{2} = \pm \sqrt{\frac{1+\cos A}{2}}$$

$$\sin \frac{A}{2} = \pm \sqrt{\frac{1-\cos A}{2}}$$

*NOTE: Either + or - is used depending upon the quadrant for the angle $\frac{A}{2}$

$$\tan \frac{A}{2} = \pm \sqrt{\frac{1-\cos A}{1+\cos A}}$$

$$\tan \frac{A}{2} = \frac{\sin A}{1 + \cos A}$$

$$\tan \frac{A}{2} = \frac{1 - \cos A}{\sin A}$$

Use the double angle identity to derive the cosine half angle identity.

Example 1: Use the half angle identities to find the following.

a) $\sin 15^\circ$

b) $\cos \frac{7\pi}{8}$

c) $\tan 195^\circ$

Example 2: Use the half angle identities to find the following.

a) Find $\sin \frac{x}{2}$, given that $\cos x = -\frac{5}{8}$, with $\frac{\pi}{2} < x < \pi$

$$\sin \frac{x}{2} = \underline{\hspace{2cm}}$$

b) Find $\tan \frac{\theta}{2}$, given that $\tan \theta = \frac{\sqrt{7}}{3}$, with $180^\circ < \theta < 270^\circ$

$$\tan \frac{\theta}{2} = \underline{\hspace{2cm}}$$