

7.4 - Double and Half Angle Identities

Skills:

- Use double and half-angle identities to verify identities
 - Use double and half-angle identities to evaluate expressions
-
-
-
-
-
-
-
-
-
-

Double Angle: Cosine

Same idea as sine...

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

If you use the Pythagorean Identity, you get...

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

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

Example

$$2\sin(2\theta)(1 - 2\sin^2(\theta)) = \sin(4\theta)$$

Example

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

Half Angle: Sine

This actually comes from re-writing one of the double angle identities of cosine!

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

Half Angle: Cosine

This actually comes from re-writing one of the double angle identities of cosine!

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

WARNING

The \pm symbol does not mean that there are two answers...it is there to tell you to put the correct sign on your answer, **based on the angle.**

(*e.g.*, $\cos\left(\frac{5\pi}{8}\right)$ must be negative)

Example

$$\cos\left(\frac{5\pi}{8}\right)$$

Example

$$\sin\left(\frac{11\pi}{12}\right)$$