

EXAMPLE Solving a Trigonometric Equation Using Identities

Solve the equation: $\cos 2\theta \cos \theta - \sin 2\theta \sin \theta = \frac{1}{2}$

$$\cos \alpha \cos \beta - \sin \alpha \sin \beta = \cos(\alpha + \beta)$$

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

$$\cos 3\theta = \frac{1}{2}$$

$$3\theta = \frac{\pi}{3} + 2\pi$$

$$3\theta = \frac{5\pi}{3} + 2\pi$$

$$\theta = \frac{\pi}{9} + \frac{2\pi}{3} \cdot \frac{6\pi}{9}$$

$$\theta = \frac{5\pi}{9} + \frac{2\pi}{3}$$

$$\theta = \frac{\pi}{9}, \frac{7\pi}{9}, \frac{13\pi}{9}, \frac{5\pi}{9}, \frac{11\pi}{9}, \frac{17\pi}{9}$$