

Solve each equation in the indicated domain.

$$1. \cos(2x - 24^\circ) = -\frac{1}{2} \quad [0^\circ, 360^\circ)$$

$$[0^\circ, 720^\circ)$$

$$[-24^\circ, 696^\circ)$$

$$2x - 24^\circ = 120^\circ, 240^\circ, 480^\circ, 600^\circ$$

$$\begin{array}{ccccccc} +24 & +24 & +24 & +24 & +24 & & \\ \hline \end{array}$$

$$2x = 144^\circ, 264^\circ, 504^\circ, 624^\circ$$

$$x = 72^\circ, 132^\circ, 252^\circ, 312^\circ$$

$$2. \cos 2x = \cos x, \quad (0^\circ, 360^\circ)$$

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

$$2\cos^2 x - \cos x - 1 = 0$$

$$(2\cos x + 1)(\cos x - 1) = 0$$

$$\cos x = -\frac{1}{2} \quad \cos x = 1$$

$$x = 120^\circ, 240^\circ$$

\*  $0^\circ$  was excluded

$$3. \csc^2 x = \cot x + 1, \quad D \in [0, 2\pi]$$

$$\cot^2 x + 1 = \cot x + 1$$

$$\cot^2 x - \cot x = 0$$

$$\cot x(\cot x - 1) = 0$$

$$\cot x = 0 \quad \cot x = 1$$

$$x = \frac{\pi}{2}, \frac{3\pi}{2}, \frac{\pi}{4}, \frac{5\pi}{4}$$

$$4. 2\cos^2 x = -3\sin x, \quad (0^\circ, 360^\circ)$$

$$2(1 - \sin^2 x) = -3\sin x$$

$$2 - 2\sin^2 x = -3\sin x$$

$$0 = 2\sin^2 x - 3\sin x - 2$$

$$0 = (2\sin x + 1)(\sin x - 2)$$

$$\sin x = -\frac{1}{2} \quad \sin x = 2$$

$$x = 210^\circ, 330^\circ$$

$$5. (\cos 2x \sin 25^\circ - \sin 2x \cos 25^\circ = \frac{\sqrt{3}}{2}) \quad [0^\circ, 360^\circ)$$

$$[0^\circ, 720^\circ)$$

$$[-25^\circ, 695^\circ)$$

$$\sin(2x - 25^\circ) = \frac{\sqrt{3}}{2}$$

$$2x - 25^\circ = 240^\circ, 300^\circ, 600^\circ, 660^\circ$$

$$\begin{array}{ccccccc} +25 & +25 & +25 & +25 & +25 & & \\ \hline \end{array}$$

$$2x = 265^\circ, 325^\circ, 625^\circ, 685^\circ$$

$$x = 132.5^\circ, 162.5^\circ, 312.5^\circ, 342.5^\circ$$