

Solve for the unknown variable on the interval  $0 \leq x < 2\pi$ .

1.  $4 \cos^2 x - 3 = 0$

$$\cos^2 x = \frac{3}{4}$$

$$\cos x = \pm \frac{\sqrt{3}}{2}$$

$$\theta = \left\{ \frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{11\pi}{6} \right\}$$

2.  $\sqrt{2} \sin 2x = 1$

$$\sin 2x = \frac{1}{\sqrt{2}}$$

$$\sin 2x = \frac{\sqrt{2}}{2}$$

$$2x = \frac{\pi}{4} \quad 2x = \frac{3\pi}{4}$$

$$x = \frac{\pi}{8} \quad x = \frac{3\pi}{8}$$

$$x = \left\{ \frac{\pi}{8}, \frac{3\pi}{8} \right\}$$

3.  $3 \cot^2 x - 1 = 0$

$$\cot^2 x = \frac{1}{3}$$

$$\cot x = \frac{1}{\sqrt{3}}$$

$$\tan x = \frac{\sqrt{3}}{1} = \frac{\sqrt{3}}{2}$$

$$x = \frac{\pi}{3} \text{ or } \frac{5\pi}{3}$$

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

4.  $\cos^3 x = \cos x$

$$\cos^3 x - \cos x = 0$$

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

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

$$x = \frac{\pi}{2}, \frac{3\pi}{2} \quad \cos x = \pm 1$$

$$x = 0, 2\pi, \pi$$

$$x = \left\{ 0, \frac{\pi}{2}, \pi, \frac{3\pi}{2}, 2\pi \right\}$$

5.  $\sin x - 2 \sin x \cos x = 0$

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

$$\sin x = 0 \quad \cos x = \frac{1}{2}$$

$$x = 0, \pi, 2\pi \quad x = \frac{\pi}{3}, \frac{5\pi}{3}$$

$$x = \left\{ 0, \frac{\pi}{3}, \pi, \frac{5\pi}{3}, 2\pi \right\}$$

\* 6.  $2 \sin^2 x - \sin x - 3 = 0$

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

$$(2b-3)(b+1) = 0$$

$$b = \frac{3}{2} \quad b = -1$$

$$\sin x = \frac{3}{2} \quad \sin x = -1$$

$$x = \sin^{-1}\left(\frac{3}{2}\right)$$

$$x = \frac{3\pi}{2}$$

7.  $\csc^2 x - \csc x - 2 = 0$

$$b = \csc x \quad b^2 - b - 2 = 0$$

$$(b-2)(b+1) = 0$$

$$b = 2 \quad b = -1$$

$$\csc x = 2 \quad \csc x = -1$$

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

$$x = \frac{\pi}{6}, \frac{5\pi}{6} \quad x = \frac{3\pi}{2}$$

$$x = \left\{ \frac{\pi}{6}, \frac{5\pi}{6}, \frac{3\pi}{2} \right\}$$

Solve for the unknown variable on the given interval.

9.  $\sqrt{3} + \tan(2x) = 0$  on  $[0, 2\pi)$ .

$$\tan(2x) = -\frac{\sqrt{3}}{1} = -\frac{\sqrt{3}}{2}$$

$$2x = \frac{2\pi}{3} \quad 2x = \frac{5\pi}{3}$$

$$x = \frac{\pi}{3} \quad x = \frac{5\pi}{6}$$

$$x = \left\{ \frac{\pi}{3}, \frac{5\pi}{6} \right\}$$

10.  $\cos(\pi x) = 0.5$  on  $[0, 2)$ .

$$\pi x = \frac{\pi}{3} \quad \pi x = \frac{5\pi}{3}$$

$$x = \frac{1}{3} \quad x = \frac{5}{3}$$

$$x = \left\{ \frac{1}{3}, \frac{5}{3} \right\}$$

11.  $\sin\left(\frac{x}{2}\right) - 1 = 0$  on  $[0, 8\pi)$ .

$$\sin\left(\frac{x}{2}\right) = 1$$

$$\frac{x}{2} = \frac{\pi}{2}$$

$$\frac{x}{2} = \frac{5\pi}{2}$$

$$x = \pi$$

$$x = 5\pi$$

$$\{ \pi, 5\pi \}$$

