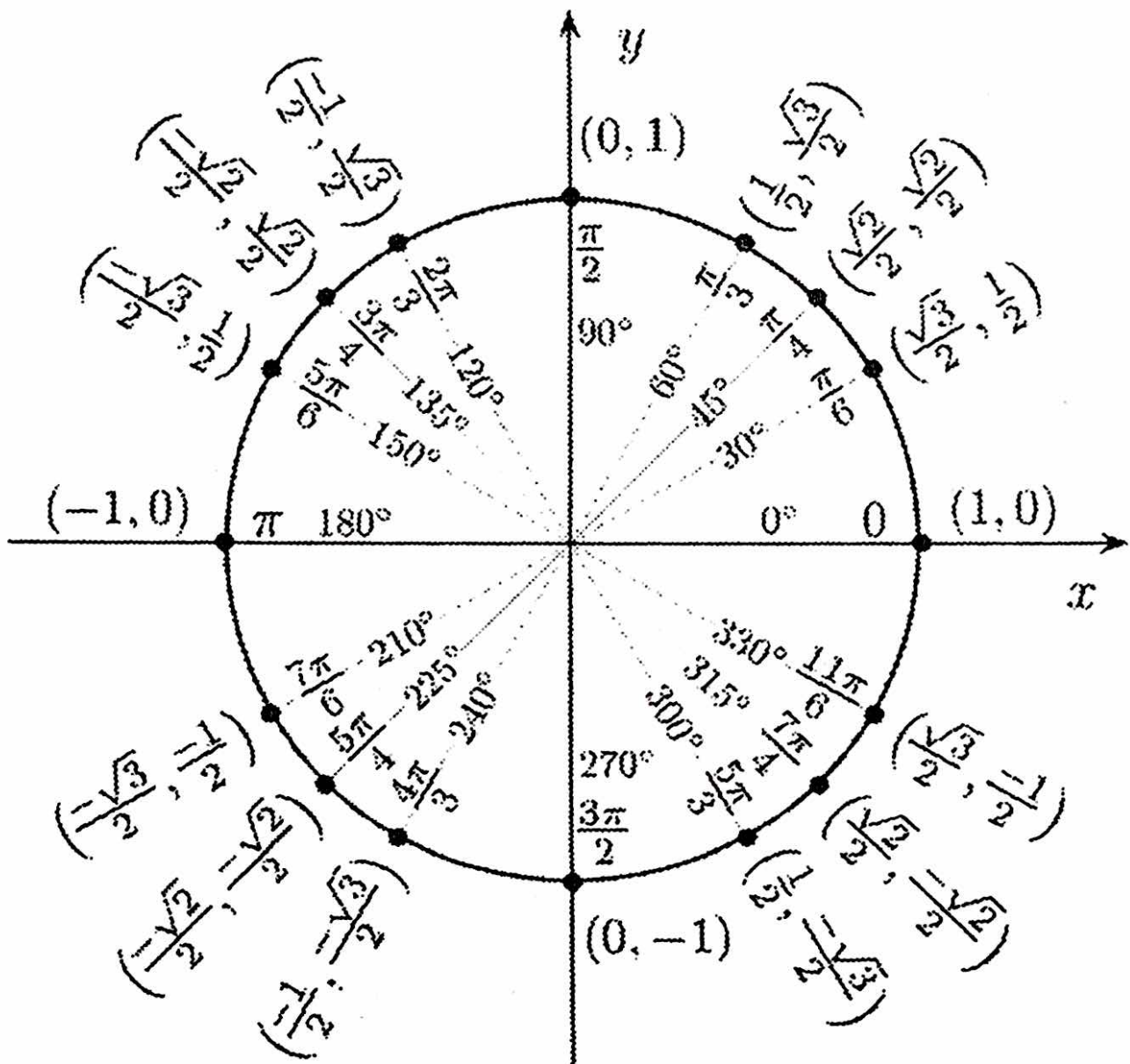# Solving Trig Equations

Find all solutions on the interval $[0, 2\pi]$
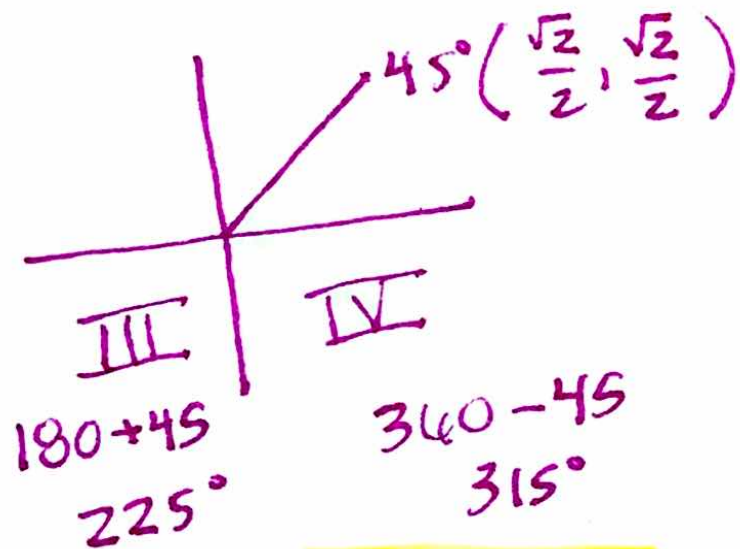
Solve by combining like terms:

$$\sin x + \sqrt{2} = -\sin x$$

$+\sin x \qquad\qquad +\sin x$

$2\sin x + \sqrt{2} = 0$

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

$\sin x = \dfrac{-\sqrt{2}}{2}$

$45° \left(\dfrac{\sqrt{2}}{2}, \dfrac{\sqrt{2}}{2}\right)$

III   IV

$180+45 \qquad 360-45$

$225° \qquad\qquad 315°$

$x = \dfrac{5\pi}{4}, \dfrac{7\pi}{4}$
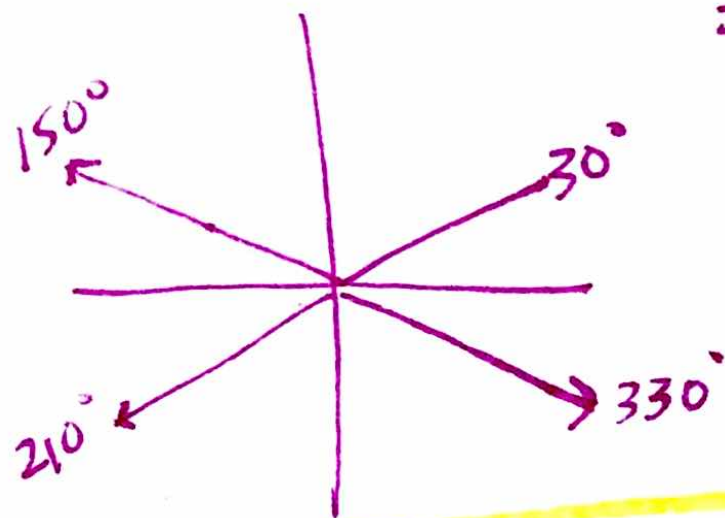
Solve with square roots:

$$3\tan^2 x - 1 = 0$$

$3\tan^2 x = 1$

$\tan^2 x = \dfrac{1}{3}$

$\tan x = \pm\sqrt{\dfrac{1}{3}} = \pm\dfrac{1}{\sqrt{3}}$

$= \pm\dfrac{\sqrt{3}}{3}$

$x = 30°$

$\sqrt{3} \quad 30 \quad 2$ 60   1

$150° \qquad 30°$

$210° \qquad 330°$

$x = \dfrac{\pi}{6}, \dfrac{5\pi}{6}, \dfrac{7\pi}{6}, \dfrac{11\pi}{6}$

Solve by factoring:

$$\csc^4 x - 4\csc^2 x = 0$$

$$\csc^2 x \left(\csc^2 x - 4\right) = 0$$

$$\csc^2 x = 0 \qquad \csc^2 x - 4 = 0$$

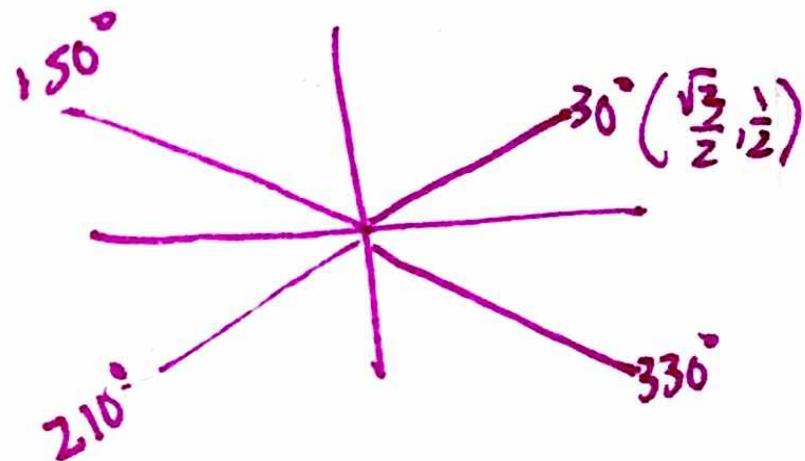$$\frac{1}{\sin x} = und.$$

never

$$\csc^2 x = 4$$

$$\csc x = \pm 2$$

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

$$x = \frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{11\pi}{6}$$

150°

30° $\left(\frac{\sqrt{3}}{2}, \frac{1}{2}\right)$

210°

330°

Quadratic type:

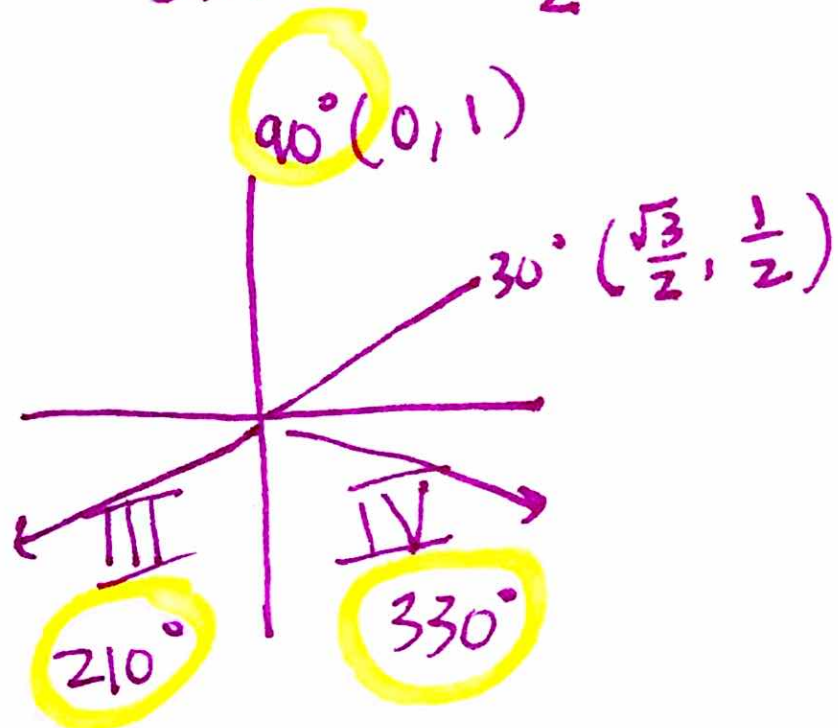$2 \sin^2 x - \sin x - 1 = 0$

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

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

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

$90° (0, 1)$

$x = \frac{\pi}{2}, \frac{7\pi}{6}, \frac{11\pi}{6}$

$30° \left(\frac{\sqrt{3}}{2}, \frac{1}{2}\right)$

III   IV

$210°$ $330°$