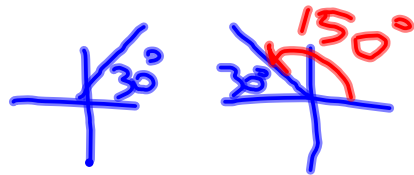


# 14.6- Solving Trigonometric Equations

Find all solutions of  $1 - 2\sin\theta = 0$ .



$$\begin{aligned} & \frac{-1}{-2} = \frac{-1}{-2} \\ & \frac{-2\sin\theta}{-2} = \frac{-1}{-2} \\ & \sin\theta = \frac{1}{2} \end{aligned}$$

$$\begin{aligned} & 30^\circ + 360^\circ n \\ & 150^\circ + 360^\circ n \end{aligned}$$

Find the exact solutions of  $\cos^2 \theta - \sqrt{2} \cos \theta + \frac{1}{2} = 0$  for  $0^\circ \leq \theta < 360^\circ$

$$x = \cos \theta$$

$$x^2 - \sqrt{2}x + \frac{1}{2} = 0$$

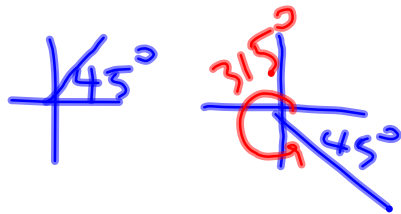
$$\begin{aligned} a &= 1 \\ b &= -\sqrt{2} \\ c &= \frac{1}{2} \end{aligned}$$

$$x = \frac{\sqrt{2} \pm \sqrt{(-\sqrt{2})^2 - 4(1)(\frac{1}{2})}}{2(1)}$$

$$= \frac{\sqrt{2} \pm \sqrt{2-2}}{2}$$

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

$$\cos \theta = \frac{\sqrt{2}}{2}$$



$$\theta = 45^\circ, 315^\circ$$

Solve  $1 + \tan^2\theta + \sec\theta = 0$  for  $0^\circ \leq \theta < 360^\circ$ .

$$\sec^2\theta + \sec\theta = 0$$

$$x = \sec\theta$$

$$x^2 + x = 0$$

$$x(x+1) = 0$$

$$x = 0, -1$$

$$\cancel{\sec\theta} = 0$$

$$\sec\theta = -1$$

$$\sec\theta = \frac{1}{\cos\theta}$$

$$\cos\theta = -1$$

$$\therefore \theta = 180^\circ$$

# Homework

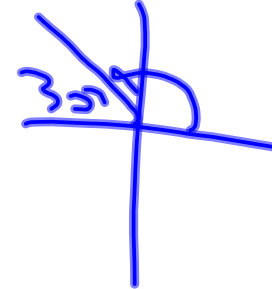
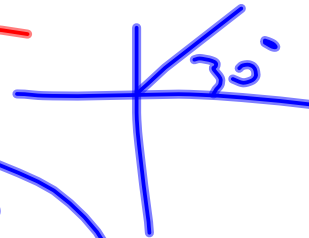
Pg. 926 #8-52 even  
exclude 44-48 even

$$8) \quad 2 \sin \theta - 1 = 0$$

$$\frac{2 \sin \theta = 1}{2}$$

$$\sin \theta = \frac{1}{2}$$

$$\theta = 30^\circ + 360^\circ n$$
$$150^\circ + 360^\circ n$$



$$10) 4 \sin \theta + 2\sqrt{3} = 0$$

$$\frac{-2\sqrt{3} \quad -2\sqrt{3}}$$

$$\frac{4 \sin \theta}{4} = \frac{-2\sqrt{3}}{4}$$

$$\sin \theta = -\frac{\sqrt{3}}{2}$$

$$\theta = 240^\circ + 360^\circ n$$
$$300^\circ + 360^\circ n$$





$$14) 2 - 3 \cos \theta = \cos \theta + 2$$

$$\begin{array}{r} - \cos \theta \quad - \cos \theta \\ \hline \end{array}$$

$$\begin{array}{r} 2 - 4 \cos \theta = 2 \\ -2 \quad \quad \quad -2 \\ \hline \end{array}$$

$$\begin{array}{r} -4 \cos \theta = 0 \\ -4 \quad \quad \quad -4 \\ \hline \end{array}$$

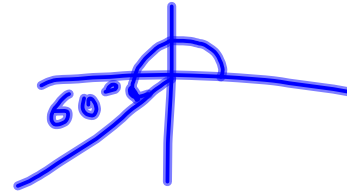
$$\cos \theta = 0$$

$$\begin{array}{l} \theta = 90^\circ + 360^\circ n \\ \quad \quad \quad 270^\circ + 360^\circ n \end{array}$$

$$16) \tan \theta - \sqrt{3} = 0$$

$$\frac{+ \sqrt{3} \quad + \sqrt{3}}$$

$$\tan \theta = \sqrt{3}$$



$$\theta = 60^\circ + 360^\circ n$$

$$240^\circ + 360^\circ n$$

$$18) \quad 6\cos\theta - 1 = 3 + 4\cos\theta$$

$$-4\cos\theta$$

$$-4\cos\theta$$

$$2\cos\theta - 1 = 3$$

$$+1 \quad +1$$

$$2\cos\theta = 4$$

$$2$$

$$2$$

$$\cancel{\cos\theta = 2}$$

No Solution

$$20) \quad 2\cos^2\theta - \cos\theta = 1$$

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

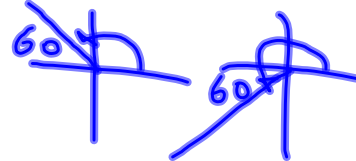
$$x = \cos\theta$$

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

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

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

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



$$\cos\theta = 1$$

$$\theta = 120^\circ, 240^\circ, 0^\circ$$

$$22) \quad 2 \sin^2 \theta - 5 \sin \theta = -2$$

$$2 \sin^2 \theta - 5 \sin \theta + 2 = 0$$

$$x = \sin \theta$$
$$2x^2 - 5x + 2 = 0$$
$$(2x - 1)(x - 2) = 0$$

$$x = \frac{1}{2}, 2$$

$$\sin \theta = \frac{1}{2}$$



$$\sin \theta = 2$$

$$\theta = 30^\circ, 150^\circ$$

$$24) \quad \underbrace{3 \cos \theta + 2}_{+ \cos^2 \theta} = \underbrace{- \cos^2 \theta}_{+ \cos^2 \theta}$$

$$\cos^2 \theta + 3 \cos \theta + 2 = 0$$

$$x = \cos \theta$$

$$x^2 + 3x + 2 = 0$$

$$(x+1)(x+2) = 0$$

$$x = -1, -2$$

$$\cos \theta = -1 \quad +$$

$$\theta = 180^\circ$$

$$\cancel{\cos \theta = -2}$$

$$2b) \sin \theta + \sin \theta \cos \theta = 0$$

$$\sin \theta (1 + \cos \theta) = 0$$

$$\sin \theta = 0 \quad + \quad \cos \theta = -1$$

$$\theta = 0^\circ, 180^\circ$$

$$28) 6\sin^2\theta - 3\sin\theta = 0$$

$$x = \sin\theta$$

$$6x^2 - 3x = 0$$

$$3x(2x - 1) = 0$$

$$x = 0, \frac{1}{2}$$

$$\sin\theta = 0 \quad \times$$



$$\sin\theta = \frac{1}{2}$$

$$\theta = 0^\circ, 180^\circ, 30^\circ, 150^\circ$$

$$30) \cos^2 \theta + 2 \cos \theta = -2$$

$$\cos^2 \theta + 2 \cos \theta + 2 = 0$$

$$X = \cos \theta$$

$$X^2 + 2X + 2 = 0$$

$$a=1$$

$$b=2$$

$$c=2$$

$$X = \frac{-2 \pm \sqrt{2^2 - 4(1)(2)}}{2(1)}$$

$$= \frac{-2 \pm \sqrt{4-8}}{2} = \frac{-2 \pm \sqrt{-4}}{2}$$

No Solution

$$32) 2 \cos^2 \theta = \sin^2 \theta + 2$$

$$2 \cos^2 \theta = 1 - \cos^2 \theta + 2$$

$$\begin{array}{r} 2 \cos^2 \theta = 3 - \cos^2 \theta \\ + \cos^2 \theta \qquad + \cos^2 \theta \\ \hline \end{array}$$

$$\begin{array}{r} 3 \cos^2 \theta = 3 \\ \hline \end{array}$$

$$\sqrt{\cos^2 \theta} = \sqrt{1}$$

$$\cos \theta = \pm 1 \quad +$$

$$\theta = 0^\circ, 180^\circ$$

$$34) \cos \theta \tan \theta = -1$$

$$\cancel{\cos \theta} \cdot \frac{\sin \theta}{\cancel{\cos \theta}} = -1$$

$$\sin \theta = -1 \quad +$$

$$\theta = 270^\circ$$

undefined

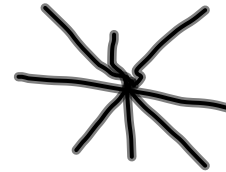
$$36) 2 \tan^2 \theta = \sec^2 \theta$$

$$2 \tan^2 \theta = \tan^2 \theta + 1$$

$$\frac{-\tan^2 \theta \quad \checkmark \tan^2 \theta}{\hline}$$

$$\sqrt{\tan^2 \theta} = \sqrt{1}$$

$$\tan \theta = \pm 1$$



$$\theta = 45^\circ, 135^\circ, 225^\circ, 315^\circ$$

$$38) \cos \theta - \sin^2 \theta = 1$$

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

$$\cos \theta - 1 + \cos^2 \theta = 1$$

$$\cos^2 \theta + \cos \theta - 2 = 0$$

$$x = \cos \theta$$

$$x^2 + x - 2 = 0$$

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

$$x = -2, 1$$

$$\cancel{\cos \theta = -2}$$

$$\cos \theta = 1$$

$$\boxed{\theta = 0^\circ}$$



$$50) |\sin \theta| = \sin \theta$$

$$-360^\circ \leq \theta \leq -180^\circ$$

OR

$$0^\circ \leq \theta \leq 180^\circ$$

$$|\cos \theta| = \cos \theta$$

$$-360^\circ \leq \theta \leq -270^\circ$$

OR

$$-90^\circ \leq \theta \leq 90^\circ$$

OR

$$270^\circ \leq \theta < 360^\circ$$