

Problem Set 6.2 odds

$$1) \frac{\sqrt{3} \sec \theta = 2}{\sqrt{3}}$$

$$\sec \theta = \frac{2}{\sqrt{3}}$$

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

~~$\theta = 30^\circ$~~ ~~$\theta = 330^\circ$~~

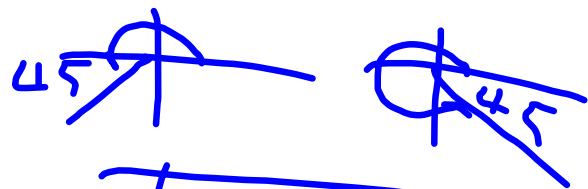
$$\theta = 30^\circ, 330^\circ$$

$$3) \sqrt{2} \cos \theta + 5 = 3$$

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

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

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



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

$$5) 4 \sin \theta - 2 \csc \theta = 0$$

$$\sin \theta \left[4 \sin \theta - \frac{2}{\sin \theta} = 0 \right]$$

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

$$4 \sin^2 \theta - 2 = 0$$

$$\frac{4 \sin^2 \theta}{4} = \frac{2}{4}$$

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

$$\sin \theta = \pm \frac{\sqrt{2}}{2}$$

~~45~~ ~~135~~ ~~225~~ ~~315~~

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

$$7) \sec \theta - 2 \tan \theta = 0$$

$$\cos \theta \left[\frac{1}{\cos \theta} - \frac{2 \sin \theta}{\cos \theta} = 0 \right]$$

$$\theta \neq 90^\circ, 270^\circ$$

$$\begin{array}{r} 1 - 2 \sin \theta = 0 \\ -1 \qquad \qquad \qquad -1 \end{array}$$

$$\begin{array}{r} -2 \sin \theta = -1 \\ -2 \qquad \qquad \qquad -2 \end{array}$$

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

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

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

$$9) \sin 2\theta - \cos \theta = 0$$

$$2 \sin \theta \cos \theta - \cos \theta = 0$$

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

$$\cos \theta = 0$$

+

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

~~30~~

~~30~~

$$\theta = 90^\circ, 270^\circ, 30^\circ, 150^\circ$$

$$11) 2 \cos \theta + 1 = \sec \theta$$

$$\cos \theta \left[2 \cos \theta + 1 = \frac{1}{\cos \theta} \right]$$

$$\theta \neq 90^\circ, 270^\circ$$

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

$$\frac{2 \cos^2 \theta + \cos \theta - 1}{2 \cos^2 \theta + \cos \theta - 1} = \frac{1 - 1}{2 \cos^2 \theta + \cos \theta - 1} = 0$$

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

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

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

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

$$\theta = 60^\circ$$

$$\cos \theta = -1$$

$$\theta = 180^\circ$$

$$\theta = 60^\circ, 300^\circ, 180^\circ$$

$$13) \cos 2x - 3 \sin x - 2 = 0$$

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

$$-1 \left[-2 \sin^2 x - 3 \sin x - 1 = 0 \right]$$

$$2 \sin^2 x + 3 \sin x + 1 = 0$$

$$x = \sin x$$

$$2x^2 + 3x + 1 = 0$$

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

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

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

$$\sin x = -1$$

$$x = 210^\circ, 330^\circ, 270^\circ$$

$$\frac{7\pi}{6}, \frac{11\pi}{6}, \frac{3\pi}{2}$$

$$15) \cos x - \cos 2x = 0$$

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

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

$$-1 \left[-2\cos^2 x + \cos x + 1 = 0 \right]$$

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

$$x = \cos x$$

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

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

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

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

~~60°~~ ~~60°~~

$$\cos x = 1$$

+

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

$$\boxed{\frac{2\pi}{3}, \frac{4\pi}{3}, 0}$$

$$17) 2\cos^2 x + \sin x - 1 = 0$$

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

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

$$-1 \left[-2\sin^2 x + \sin x + 1 = 0 \right]$$

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

$$x = \sin x$$

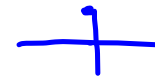
$$2x^2 - x - 1 = 0$$

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

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

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

$$\sin x = 1$$



$$x = 210^\circ, 330^\circ, 90^\circ$$

$$\boxed{\frac{7\pi}{6}, \frac{11\pi}{6}, \frac{\pi}{2}}$$

$$19) 4\sin^2 x + 4\cos x - 5 = 0$$

$$4(1 - \cos^2 x) + 4\cos x - 5 = 0$$

$$4 - 4\cos^2 x + 4\cos x - 5 = 0$$

$$-1 \left[-4\cos^2 x + 4\cos x - 1 = 0 \right]$$

$$4\cos^2 x - 4\cos x + 1 = 0$$

$$x = \cos x$$

$$2x^2 - 4x + 1 = 0$$

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

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

~~$x = 60^\circ$~~ ~~$x = 60^\circ$~~

~~$x = 60^\circ, 30^\circ$~~

$\frac{\pi}{3}, \frac{5\pi}{3}$

$$2) \quad 2 \sin x + \cot x - \csc x = 0$$

$$\sin x \left[2 \sin x + \frac{\cos x}{\sin x} - \frac{1}{\sin x} = 0 \right]$$

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

$$x \neq 0^\circ, 180^\circ$$

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

$$-1 \left[2 - 2\cos^2 x + \cos x - 1 = 0 \right]$$

$$x = \cos x$$

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

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

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

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

~~60°~~ ~~63°~~

$$\cos x = 1$$

+

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

$$\boxed{\frac{2\pi}{3} \quad | \quad \frac{4\pi}{3}}$$

$$23) \sin x + \cos x = \sqrt{2}$$

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

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

$$\frac{(1 - \cos^2 x) - \cos^2 x}{-1 + \cos^2 x} = \frac{\cos^2 x - 2\sqrt{2} \cos x + 2}{+ \cos^2 x - 1}$$

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

$$x = \cos x$$

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

$$a = 2$$

$$b = -2\sqrt{2}$$

$$c = 1$$

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

$$= \frac{2\sqrt{2} \pm \sqrt{0}}{4}$$

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

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

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

$$\frac{\pi}{4}, \frac{7\pi}{4}$$

$$25) \sqrt{3} \sin \theta + \cos \theta = \sqrt{3}$$

$$\frac{-\sqrt{3} \sin \theta \quad -\sqrt{3} \sin \theta}{\hline}$$

$$(\cos \theta)^2 = (\sqrt{3} - \sqrt{3} \sin \theta)^2$$

$$\cos^2 \theta = 3 - 6 \sin \theta + 3 \sin^2 \theta$$

$$1 - \sin^2 \theta = 3 \sin^2 \theta - 6 \sin \theta + 3$$

$$4 \sin^2 \theta - 6 \sin \theta + 2 = 0$$

$$2 \sin^2 \theta - 3 \sin \theta + 1 = 0$$

$$x = \sin \theta$$

$$2x^2 - 3x + 1 = 0$$

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

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

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

~~30°~~

$$\sin \theta = 1$$

$$\theta = 30^\circ, \cancel{150^\circ}, 90^\circ$$

$$27) \sqrt{3} \sin \theta - \cos \theta = 1$$

$$(\sqrt{3} \sin \theta - \cos \theta)^2 = (1)^2$$

$$3 \sin^2 \theta - 2 \cos \theta + \cos^2 \theta = 1$$

$$3(1 - \cos^2 \theta) - 2 \cos \theta + \cos^2 \theta = 1$$

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

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

$$2(\cos^2 \theta + \cos \theta - 1) = 0$$

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

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

$$\theta = 60^\circ, 300^\circ, 180^\circ$$

$$(-\cos \theta)^2 = (1 - \sqrt{3} \sin \theta)^2$$

$$\cos^2 \theta = 1 - 2\sqrt{3} \sin \theta + 3 \sin^2 \theta$$

$$1 - \sin^2 \theta = 3 \sin^2 \theta - 2\sqrt{3} \sin \theta + 1$$

$$4 \sin^2 \theta - 2\sqrt{3} \sin \theta = 0$$

$$2 \sin^2 \theta - \sqrt{3} \sin \theta = 0$$

$$\sin \theta (2 \sin \theta - \sqrt{3}) = 0$$

$$\sin \theta = 0, \sin \theta = \frac{\sqrt{3}}{2}$$

$$\theta = 0^\circ, 180^\circ, 60^\circ, 120^\circ$$

$$29) \sin \frac{\theta}{2} - \cos \theta = 0$$

$$\pm \sqrt{\frac{1 - \cos \theta}{2}} - (\cos \theta = 0$$

$$\left(\pm \sqrt{\frac{1 - \cos \theta}{2}} \right)^2 = (\cos \theta)^2$$

$$2 \left[\frac{1 - \cos \theta}{2} = \cos^2 \theta \right]$$

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

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

$$x = \cos \theta$$

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

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

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

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

$$\theta = 60^\circ, 300^\circ$$

$$\cos \theta = -1$$

$$\theta = 180^\circ$$

$$\theta = 60^\circ, 300^\circ, 180^\circ$$

$$31) \cos \frac{\theta}{2} - \cos \theta = 1$$

$$+ \cos \theta + \cos \theta$$

$$\left(\pm \sqrt{\frac{1 + \cos \theta}{2}} \right)^2 = (\cos \theta + 1)^2$$

$$2 \left[\frac{1 + \cos \theta}{2} = \cos^2 \theta + 2 \cos \theta + 1 \right]$$

$$4 \cos \theta = 2 \cos^2 \theta + 4 \cos \theta + 2$$

$$2 \cos^2 \theta + 3 \cos \theta + 1 = 0$$

$$x = \cos \theta$$

$$2x^2 + 3x + 1 = 0$$

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

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

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

~~60°~~ ~~300°~~

$$\cos \theta = -1$$

~~180°~~

$$\theta = 120^\circ, \cancel{240^\circ}, 180^\circ$$

$$33) 6 \cos \theta + 7 \tan \theta = \sec \theta$$

$$\cos \theta \left[6 \cos \theta + \frac{7 \sin \theta}{\cos \theta} = \frac{1}{\cos \theta} \right]$$

$$6 \cos^2 \theta + 7 \sin \theta = 1$$

$$6 \cos^2 \theta + 7 \sin \theta - 1 = 0$$

$$6(1 - \sin^2 \theta) + 7 \sin \theta - 1 = 0$$

$$-1 \left[6 - 6 \sin^2 \theta + 7 \sin \theta - 1 = 0 \right]$$

$$6 \sin^2 \theta - 7 \sin \theta - 5 = 0$$

$$(2x - 5)(2x + 1)$$

$$x = \frac{5}{2}, -\frac{1}{2}$$

$$\cancel{\sin \theta = \frac{5}{3}}$$

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

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

$$35) 23 \csc^2 \theta - 22 \cot \theta \csc \theta - 15 = 0$$

$$\text{Div?} \left[\frac{23}{\sin^2 \theta} - \frac{22 \cos \theta}{\sin^2 \theta} - 15 = 0 \right]$$

$$23 - 22 \cos \theta - 15 \sin^2 \theta = 0$$

$$23 - 22 \cos \theta - 15(1 - \cos^2 \theta) = 0$$

$$23 - 22 \cos \theta - 15 + 15 \cos^2 \theta = 0$$

$$15 \cos^2 \theta - 22 \cos \theta + 8 = 0$$

$$15x^2 - 22x + 8 = 0$$

$$(5x - 4)(3x - 2) = 0$$

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

$$\cos \theta = \frac{4}{5}$$

$$\theta = 36.9^\circ$$

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

$$\theta = 48.2^\circ$$

$$\theta = 36.9^\circ, 323.1^\circ, 48.2^\circ, 311.8^\circ$$