

pg. 324 #45

pg. 331 #13-29, 33 odds

$$\begin{aligned}
 45. \quad -2\cos^2\theta &= \sin^4\theta - \cos^4\theta - 1 \\
 &= (\sin^2\theta - \cos^2\theta)(\sin^2\theta + \cos^2\theta) - 1 \\
 &= \sin^2\theta - \cos^2\theta - 1 \\
 &= (1 - \cos^2\theta) - \cos^2\theta - 1 \\
 &= -2\cos^2\theta
 \end{aligned}$$

$$\begin{aligned}
 13. \quad \sin^4x + 2\sin^2x - 3 &= 0 \\
 (\sin^2x - 1)(\sin^2x + 3) &= 0 \\
 \sin^2x = 1 \quad \sin^2x = -3 \\
 \sin x = \pm 1 \\
 x = \pi/2, 3\pi/2
 \end{aligned}$$

$$\begin{aligned}
 15. \quad 4\cot x &= \cot x \sin^2x \\
 4\cot x - \cot x \sin^2x &= 0 \\
 \cot x (4 - \sin^2x) &= 0 \\
 \cot x = 0 \quad 4 - \sin^2x = 0 \\
 \frac{\cos x}{\sin x} = 0 \quad 4 = \sin^2x \\
 \cos x = 0 \quad \pm 2 = \sin x \\
 x = \pi/2, 3\pi/2
 \end{aligned}$$

$$\begin{aligned}
 17. \quad \cos^3x + \cos^2x - \cos x &= 1 \\
 \cos^3x + \cos^2x - \cos x - 1 &= 0 \\
 (x+1)(x+1)(x-1) &= 0 \\
 (\cos x + 1)(\cos x + 1)(\cos x - 1) &= 0 \\
 \cos x = -1 \quad \cos x = 1 \\
 x = \pi \quad x = 0
 \end{aligned}$$

$$19a. 40 = \frac{1}{32} (50)^2 \sin(2\theta)$$

$$40 = \frac{1}{32} \cdot 2500 \cdot \sin(2\theta)$$

$$1280 = 2500 \cdot \sin(2\theta)$$

$$\frac{1280}{2500} = \sin(2\theta)$$

$$\frac{64}{125} = \sin(2\theta)$$

$$\frac{\sin^{-1}\left(\frac{64}{125}\right)}{2} = \theta$$

$$\theta = 15.4^\circ, 74.6^\circ$$

$$b. 50 = \frac{1}{32} \cdot (50)^2 \sin(2\theta)$$

$$1 = \frac{1}{32} \cdot 50 \sin(2\theta)$$

$$\frac{32}{50} = \sin(2\theta)$$

$$\frac{\sin^{-1}\left(\frac{32}{50}\right)}{2} = \theta$$

$$\theta = 19.9^\circ, 70.1^\circ$$

$$21. 1 = \cot^2 x + \csc x$$

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

$$0 = \csc^2 x + \csc x$$

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

$$\csc x = 0$$

$$1 + \csc x = 0$$

$$\csc x = -1$$

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

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

$$1 = (\csc^2 x - 1) + \csc x$$

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

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

$$\csc x = -2$$

$$\csc x = 1$$

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

$$\sin x = 1$$

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

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

$$23. \tan^2 x = 1 - \sec x$$

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

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

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

$$\sec x = -2$$

$$\sec x = 1$$

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

$$\cos x = 1$$

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

$$x = 0$$

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

$$25. 2 - 2\cos^2 x = \sin x + 1$$

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

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

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

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

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

$$\sin x = 1$$

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

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

$$27. 3\sin x = 3 - 3\cos x$$

$$\sin x = 1 - \cos x$$

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

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

$$1 = 1$$

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

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

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

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

$$2\cos x = 0$$

$$\cos x = 1$$

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

$$x = 0$$

$$29. \sec^2 x - 1 + \tan x - \sqrt{3}\tan x = \sqrt{3}$$

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

$$\tan^2 x + \tan x - \sqrt{3}\tan x = \sqrt{3}$$

$$\tan^2 x + \tan x - \sqrt{3}\tan x - \sqrt{3} = 0$$

$$\tan^2 x + (1 - \sqrt{3})\tan x - \sqrt{3} = 0$$

$$(\tan x - \sqrt{3})(\tan x + 1) = 0$$

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

$$\tan x = -1$$

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

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

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

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

$$x = \frac{7\pi}{4}$$

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

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

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

33.

$$\frac{\cos x}{1 + \sin x} + \frac{1 + \sin x}{\cos x} = -4$$

$$\frac{(1 - \sin x) \cos x}{1 - \sin^2 x} + \frac{1 + \sin x}{\cos x} = 4$$

$$\frac{(1 - \sin x) \cos x}{\cos^2 x} + \frac{1 + \sin x}{\cos x} = 4$$

$$\frac{(1 - \sin x) \cos x}{\cos^2 x} + \frac{(1 + \sin x) \cos x}{\cos^2 x} = 4$$

$$\frac{\cos x - \sin x \cos x + \cos x + \sin x \cos x}{\cos^2 x} = -4$$

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

$$2 \cos x = -4 \cos^2 x$$

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

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

$$2 \cos x = 0 \quad 2 \cos x + 1 = 0$$

$$\cos x = 0$$

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

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

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