

p. 364 31-35 odd, 39-40 all

$$31. 2 \sin^2 x + 3 \sin x + 1 = 0$$

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

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

$$\sin x = -1/2$$

$$\sin x + 1 = 0$$

$$\sin x = -1$$

$$x = \left\{ \frac{7\pi}{6}, \frac{11\pi}{6}, \frac{3\pi}{2} \right\} \quad (\text{textbook gives decimal approximations of these 3s})$$

$$33. 4 \sin^2 x = 2 \cos x + 1$$

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

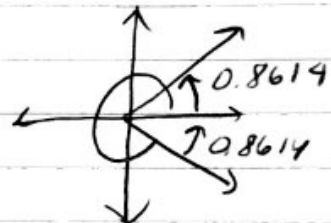
$$4 - 4 \cos^2 x = 2 \cos x + 1$$

$$4 \cos^2 x + 2 \cos x - 3 = 0$$

$$\cos x = \frac{-2 \pm \sqrt{2^2 - 4(4)(-3)}}{8} = \frac{-2 \pm \sqrt{52}}{8} = \frac{-1 \pm \sqrt{13}}{4}$$

$$\cos x = -1.1514 / 0.6514$$

$$x = \cos^{-1}(0.6514) = 0.8614 \text{ and } 5.4218$$



$$35. \csc x + \cot x = 1$$

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

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

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

$$0 = -2 \cot x$$

$$\cot x = 0$$

$\tan x$ is undefined

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

$$39. \sin 2x = -\frac{\sqrt{3}}{2}$$

$$2x = \frac{4\pi}{3} + 2n\pi \quad 2x = \frac{5\pi}{3} + 2n\pi$$

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

$$x = \left\{ \frac{2\pi}{3}, \frac{5\pi}{3}, \frac{5\pi}{6}, \frac{11\pi}{6} \right\}$$

$$40. \sec 4x = 2$$

$$\cos 4x = \frac{1}{2}$$

$$4x = \frac{\pi}{3} + 2n\pi, \quad 4x = \frac{5\pi}{3} + 2n\pi$$

$$x = \frac{\pi}{12} + \frac{n\pi}{2}, \quad x = \frac{5\pi}{12} + \frac{n\pi}{2}$$

$$x = \left\{ \frac{\pi}{12}, \frac{7\pi}{12}, \frac{13\pi}{12}, \frac{19\pi}{12}, \frac{5\pi}{12}, \frac{11\pi}{12}, \frac{17\pi}{12}, \frac{23\pi}{12} \right\}$$

$$41. 2\sin^2 2x = 1$$

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

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

$$2x = \frac{\pi}{4} + 2n\pi, \quad 2x = \frac{3\pi}{4} + 2n\pi, \quad 2x = \frac{5\pi}{4} + 2n\pi, \quad 2x = \frac{7\pi}{4} + 2n\pi$$

$$x = \frac{\pi}{8} + n\pi, \frac{3\pi}{8} + n\pi, \frac{5\pi}{8} + n\pi, \frac{7\pi}{8} + n\pi$$

$$\left\{ \frac{\pi}{8}, \frac{9\pi}{8}, \frac{3\pi}{8}, \frac{11\pi}{8}, \frac{5\pi}{8}, \frac{13\pi}{8}, \frac{7\pi}{8}, \frac{15\pi}{8} \right\}$$

$$42. \tan^2 3x = 3$$

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

$$3x = \frac{\pi}{3} + n\pi, \quad 3x = \frac{2\pi}{3} + n\pi$$

$$x = \frac{\pi}{9} + \frac{n\pi}{3}, \quad \frac{2\pi}{9} + n\pi$$

$$x = \left\{ \frac{\pi}{9}, \frac{4\pi}{9}, \frac{7\pi}{9}, \frac{10\pi}{9}, \frac{13\pi}{9}, \frac{16\pi}{9}, \frac{2\pi}{9}, \frac{5\pi}{9}, \frac{8\pi}{9}, \frac{11\pi}{9}, \frac{14\pi}{9}, \frac{17\pi}{9} \right\}$$

43. $\tan 3x (\tan x - 1) = 0$

$\tan 3x = 0$

$\tan x = 1$

$3x = 0 + n\pi$

$x = \frac{\pi}{4} + n\pi$

$x = 0 + \frac{n\pi}{3}$

$x = 0, \frac{\pi}{3}, \frac{2\pi}{3}, \pi, \frac{4\pi}{3}, \frac{5\pi}{3}, \frac{\pi}{4}, \frac{5\pi}{4}$

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

$\cos 2x = 0$

$2\cos x + 1 = 0$

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

$\cos x = -1/2$

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

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

$x = \frac{4\pi}{3} + 2n\pi$

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

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

$\frac{x}{2} = \frac{\pi}{4} + 2n\pi$

$\frac{x}{2} = \frac{7\pi}{4} + 2n\pi$

$x = \frac{\pi}{2} + 4n\pi$

$x = \frac{7\pi}{2} + 4n\pi$

46. $\tan \frac{x}{3} = 1$

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

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