odd

HW #43 p. 324 45 & p. 331 13-29, 33

p. 324 45. $-2\cos^2\theta = \sin^4\theta - \cos^4\theta - 1$

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

$= (\sin^2 - \cos^2) \cdot 1 - 1$

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

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

$= -2\cos^2\theta$

p. 331

13. $\sin^4 x + 2\sin^2 x - 3 = 0$ $\quad x = \sin x$

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

$(x^2 + 3)(x^2 - \;) = 0$

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

$-3 \quad -3$ $\quad x^2 = 1$

$x^2 \neq -3$ $\quad x = \pm 1$ $\quad \boxed{x = \frac{\pi}{2}, \frac{3\pi}{2}}$

no solution $\quad \sin x = \pm 1$

15. $4\cot x = \cot x \sin^2 x$

$-4\cot x \qquad -4\cot x$

$0 = \cot x \sin^2 x - 4\cot x$

$0 = \cot x (\sin^2 x - 4)$

$\cot x = 0$ $\quad \sin^2 x - 4 = 0$

$\frac{\cos x}{\sin x} = 0$ $\quad \sin^2 x = 4$

$\boxed{x = \frac{\pi}{2}, \frac{3\pi}{2}}$ $\quad \sin x = \pm 2$ no solution

17. $(\cos^3 x + \cos^2 x) - \cos x = 1$

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

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

common factors

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

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

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

$\cos x = \pm 1$

$[0, \pi, 2\pi]$

19. $40 = \frac{1}{32}(50)^2 \sin 2\theta$ $\quad$ $[15.4°, 74.6°]$

$.512 = \sin 2\theta$

$\sin^{-1}(.512) = 2\theta$

$\frac{30.8}{2} = \frac{2\theta}{2}$ or $180° - 30.8 = 2\theta$

$[15.4° = \theta]$ or $149.2 = 2\theta$

$[\theta = 74.6°]$

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

$[19.9°, 70.1°]$

#43

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

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

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

$-1 \qquad\qquad -1$ $\quad \csc x = \frac{1}{\sin x}$

$0 = x^2 + x - 2$

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

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

$x = -2 \qquad x = 1$

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

$\csc x = -2 \qquad \csc x = 1$

look for where $\sin x = \frac{-1}{2}$

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

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

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

$+\sec x \quad -1 \quad -1 + \sec x$

$\sec^2 x + \sec x - 2 = 0$ $\quad \sec = \frac{1}{\cos x}$

$x^2 + x - 2 = 0$

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

$x = -2 \qquad x = 1$

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

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

look for where $\cos x = \frac{-1}{2}$

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

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

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

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

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

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

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

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

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

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

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

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

$\frac{3\sin x}{3} + \frac{3\cos x}{3} = \frac{3}{3}$

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

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

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

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

$-1 \qquad\qquad -1$

$\frac{2\sin x \cos x}{2} = \frac{0}{2}$

$\sin x \cos x = 0$

$\sin x = 0 \quad \cos x = 0$

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

Check for $\frac{3\pi}{2}$ & π do not work.

#43

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

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

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

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

$\tan x = -1$

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

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

$\tan x = \sqrt{3}$

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

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

33. $\frac{\cos x}{1+\sin x}\cdot\frac{(1-\sin x)}{(1-\sin x)} + \frac{1+\sin x}{\cos x}\cdot\frac{\cos x}{\cos x} = -4$

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

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

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

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

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

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

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