# P. 452 #51-61 odd + P. 475 #5-9 odd + #23-29 odd

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51. $2\cos x \sin x - \cos x = 0$

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

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

$\cos^{-1}(0) = \theta \quad \sin^{-1}\left(\frac{1}{2}\right) = \theta$

$\theta = \frac{\pi}{2}, \frac{3\pi}{2}, \frac{5\pi}{6}, \frac{\pi}{6} \quad \theta = \frac{\pi}{6}, \frac{5\pi}{6}$

55. $\tan^2 x = 3$

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

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

$\frac{1}{2}$

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

57. $4\cos^2 x - 4\cos x + 1 = 0$

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

$2\cos x - 1 = 0$

$2\cos x = 1$

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

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

59. $\sin^2\theta - 2\sin\theta = 0$

$x^2 - 2x = 0$

$x(x-2) = 0$

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

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

$0 + k\pi \quad \sin\theta = 2$

No value

61. $\cos(\sin x) = 1$

$\cos^{-1}(1) = \sin x$

$0 = \sin x$

$x = 0 + k\pi$

~~63.~~

~~65.~~

# 475 #5-9 odd + 23-29 odd

$\sin 2x = 2\sin x$

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

$2\sin x\cos x - 2\sin x = 0$ $\quad x = 0, \pi$

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

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

$\sin x = 0 \quad \cos x = 1$

7. $\cos 2x = \sin x$

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

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

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

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

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

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

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

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

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

9. $\sin 2x - \tan x = 0$

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

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

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

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

$\sin x = 0 \quad \cos^2 x = \frac{1}{2}$

$\cos x = \pm\sqrt{\frac{1}{2}}$

$x = 0, \pi, \frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}$

23. $\cos 2x + \cos x = 0$

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

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

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

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

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

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

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

$\cos x = 1/2 \quad \cos^{-1}(-1) = \theta$

$\cos^{-1}(1/2) = \theta$

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

25.

$\cos x + \cos 3x = 0$

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

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

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

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

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

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

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

$\cos x = 0 \quad \cos^2 x = \sin^2 x$

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

27. $\sin 2x + \sin 4x = 0$

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

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

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

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

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

$2\sin x\cos x + 8\sin x\cos^3 x - 4\sin x\cos x = 0$

$8\sin x\cos^3 x - 2\sin x\cos x = 0$

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

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

$2\sin x\cos x = 0$ $\quad 4\cos^2 x - 1 = 0$

$\cos^2 x = 1/4$

$\cos x = \pm 1/2$

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

29. Uses quadratic formula!