

NAME

Key

PERIOD

PRECAL

WS#1

SOLVE: $0 \leq \theta < 2\pi$

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

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

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

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

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

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

$$\boxed{\begin{array}{l} \frac{\pi}{3}, \frac{2\pi}{3} \\ \frac{4\pi}{3}, \frac{5\pi}{3} \end{array}}$$

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

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

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

$$0 = \cos x (2 \sin x - \sqrt{2})$$

$$\cos x = 0$$

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

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

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

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

2) $\cos x + \cos\left(\frac{\pi}{2} - x\right) = 0$

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

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

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

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

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

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

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

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

EXTRANEUS

$$x = \frac{\pi}{4}, \boxed{\frac{3\pi}{4}}, \frac{5\pi}{4}, \boxed{\frac{7\pi}{4}} \pm \frac{\sqrt{2}}{2} = \sin x$$

4) $4 \sin x \cos x = 1$

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

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

$$\sin(2x) = \frac{1}{2}$$

$$2x = \frac{\pi}{6} + 2\pi \text{ or } 2x = \frac{5\pi}{6} + 2\pi$$

$$x = \frac{\pi}{12} + \pi$$

$$\frac{13\pi}{12}$$

$$x = \frac{5\pi}{12} + \pi$$

$$\frac{17\pi}{12}$$

$$\boxed{\begin{array}{l} x = \frac{\pi}{12}, \frac{5\pi}{12} \\ \frac{13\pi}{12}, \frac{17\pi}{12} \end{array}}$$

$$5) \cos 2x - \cos x = 0$$

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

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

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

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

$$\cos x = 1$$

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

$$x = 0$$

$$6) 4\sin^2 2x = 1$$

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

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

$$2x = \frac{\pi}{6} + 2\pi; 2x = \frac{5\pi}{6} + 2\pi; 2x = \frac{7\pi}{6} + 2\pi; 2x = \frac{11\pi}{6} + 2\pi$$

$$x = \frac{\pi}{12} + \pi$$

$$x = \frac{5\pi}{12} + \pi$$

$$x = \frac{7\pi}{12} + \pi$$

$$x = \frac{11\pi}{12} + \pi$$

$$\frac{\pi}{12}, \frac{5\pi}{12}, \frac{7\pi}{12}, \frac{11\pi}{12}$$

$$\frac{13\pi}{12}, \frac{17\pi}{12}, \frac{19\pi}{12}, \frac{23\pi}{12}$$

$$7) \sin\left(x + \frac{\pi}{3}\right) + \sin\left(x - \frac{\pi}{3}\right) = 1$$

$$\sin x \cos \frac{\pi}{3} + \cos x \sin \frac{\pi}{3} + \sin x \cos \frac{\pi}{3} - \cos x \sin \frac{\pi}{3} = 1$$

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

$$2 \sin x \left(\frac{1}{2}\right) = 1$$

$$\sin x = 1$$

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

$$8) \cos\left(x + \frac{\pi}{4}\right) - \cos\left(x - \frac{\pi}{4}\right) = 1$$

$$\cos x \cos \frac{\pi}{4} - \sin x \sin \frac{\pi}{4} - \left(\cos x \cos \frac{\pi}{4} + \sin x \sin \frac{\pi}{4}\right) = 1$$

$$-2 \sin x \sin \frac{\pi}{4} = 1$$

$$-2 \sin x \left(\frac{\sqrt{2}}{2}\right) = 1$$

$$-\sin x (\sqrt{2}) = 1$$

$$\sin x = -\frac{1}{\sqrt{2}} \text{ or } -\frac{\sqrt{2}}{2}$$

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