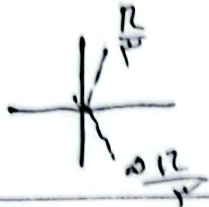


$$\sec x = 1 + \tan^2 x = \frac{1}{\cos^2 x} \Rightarrow \sec^2 x = 1 \Rightarrow \cos x = \pm 1$$

$$\Rightarrow x = 2k\pi \pm \frac{\pi}{2} \Rightarrow \boxed{x = \left\{ \frac{\pi}{2}, \frac{3\pi}{2} \right\}}$$



پ. جواب

✓ (۲)

$$2(1 - \cos^2 x) + 2(4 \cos^3 x - 3 \cos x) = -1 \Rightarrow 2 - 2 \cos^2 x + 8 \cos^3 x - 6 \cos x = -1$$

$$\Rightarrow 8 \cos^3 x - 2 \cos^2 x - 6 \cos x + 3 = 0$$

$$\Rightarrow 8t^3 - 2t^2 - 6t + 3 = 0 \Rightarrow (t+1)(8t^2 - 10t + 3) = 0$$

$$\Rightarrow \cos x = -1 \Rightarrow x = \pi$$

$$\Rightarrow \cos x = -1 \Rightarrow x = \pi$$

✓ (۲)

پ. جواب

$$2 \sin x (1 - 2 \sin^2 x) + \sin x = 1 \Rightarrow -4 \sin^3 x + 3 \sin x - 1 = 0$$

$$\Rightarrow -4t^3 + 3t - 1 = 0 \Rightarrow (t+1)(-4t^2 + 5t - 1) = 0$$

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

$$\Rightarrow \sin x = \frac{1}{2} \Rightarrow x = \frac{\pi}{6}, \frac{5\pi}{6}$$

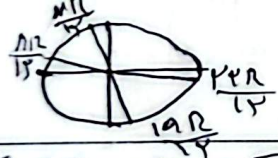


پ. جواب $\left\{ \frac{\pi}{6}, \frac{5\pi}{6}, \frac{3\pi}{2} \right\}$

$$\frac{1}{\sin(x + \frac{\pi}{6})} + \frac{1}{\cos(x + \frac{\pi}{6})} = \frac{1}{\cos x} + \frac{1}{\sin x \cos x} = \frac{\sin 2x + 1}{\sin 2x \cos x} = 0$$

$$\Rightarrow \sin 2x + 1 = 0 \Rightarrow \sin 2x = -1 \Rightarrow 2x = \frac{3\pi}{2} \Rightarrow x = \frac{3\pi}{4}$$

$$\Rightarrow 2x = \frac{7\pi}{2} \Rightarrow x = \frac{7\pi}{4}$$



$$\Rightarrow \frac{11\pi}{4} - \frac{7\pi}{4} = \frac{4\pi}{4} = \pi = \alpha \Rightarrow \tan \alpha = \tan \frac{\pi}{4} = 1$$

$$\cos x - \sin x = \sqrt{2} \cos(x + \frac{\pi}{4}) \Rightarrow x + \frac{\pi}{4} = \frac{\pi}{2} \Rightarrow \sin 2x = \sin(2x - \frac{\pi}{2}) = -\cos 2x$$

$$\Rightarrow m\sqrt{2} \cos t + \sqrt{2} \cos 2t = \sqrt{2} \Rightarrow \cos 2t = \cos t - 1 = \frac{1}{2} - 1 = -\frac{1}{2}$$

$$\frac{m\sqrt{2}}{\sqrt{2}} + \sqrt{2} = \sqrt{2} \Rightarrow \frac{m\sqrt{2}}{\sqrt{2}} = 0 \Rightarrow m = 0$$

✓ (۲)

$$\cos(x) = \cos(x) \Rightarrow \sin(x + \frac{\pi}{2}) \cos(x - \frac{\pi}{2}) = 1$$

$$\Rightarrow \sin(x + \frac{\pi}{2}) \propto \sin(x + \frac{\pi}{2}) = 1 \Rightarrow \sin(x + \frac{\pi}{2}) = 1$$

$$\Rightarrow \sin(x + \frac{\pi}{2}) = \pm 1 \Rightarrow \cos(x + \frac{\pi}{2}) = 0 \Rightarrow x + \frac{\pi}{2} = k\pi + \frac{\pi}{2}$$

$$x = k\pi + \frac{\pi}{2} \Rightarrow \text{Diagram of a circle with angle } \frac{\pi}{2} \text{ and } \frac{3\pi}{2} \text{ marked.} \Rightarrow \boxed{x = k\pi + \frac{\pi}{2}}$$

$$a \sin x + b \cos x = \frac{a}{\sqrt{a^2+b^2}} \sin(x + \alpha) \mid \tan \alpha = \frac{b}{a} \Rightarrow \alpha = \sqrt{r}$$

$$\Rightarrow \sin x + \sqrt{3} \cos x = 2 \sin(x + \frac{\pi}{6}) = 2 \Rightarrow \sin(x + \frac{\pi}{6}) = 1$$

$$\Rightarrow x + \frac{\pi}{6} = 2k\pi + \frac{\pi}{6} \Rightarrow x = 2k\pi \Rightarrow x = \{0, 2\pi, 4\pi, \dots\}$$

$$x + \frac{\pi}{6} = 2k\pi + \frac{5\pi}{6} \Rightarrow x = 2k\pi + \frac{2\pi}{3} \Rightarrow x = \{ \frac{2\pi}{3}, \frac{8\pi}{3}, \frac{14\pi}{3}, \dots \}$$

$$\sin(x) \propto (-\cos(x)) = -\sin(x) \cos(x) = -\sin(2x) = 1 \Rightarrow \sin(2x) = -1$$

$$\textcircled{1} 2x = 2k\pi + \frac{3\pi}{2} \Rightarrow x = k\pi + \frac{3\pi}{4} \quad \textcircled{2} 2x = 2k\pi + \frac{5\pi}{2} \Rightarrow x = k\pi + \frac{5\pi}{4}$$

$$\textcircled{1} \frac{k}{2} \mid \frac{3\pi}{4} \mid \frac{1}{2} \quad \textcircled{2} \frac{k}{2} \mid \frac{5\pi}{4} \mid \frac{1}{2} \Rightarrow \boxed{x = k\pi + \frac{3\pi}{4} \text{ or } k\pi + \frac{5\pi}{4}}$$

$$\text{مجموع} = \frac{3\pi + 5\pi + 3\pi + 5\pi}{4} = \frac{16\pi}{4} = 4\pi$$

$$\cos^2 \alpha \cos^2 \alpha \cos^2 \alpha = 1 \cos^2 \alpha \cos^2 \alpha \cos^2 \alpha = \frac{1}{8} \Rightarrow \cos^2 \alpha = \frac{1}{2} \Rightarrow \cos \alpha = \pm \frac{1}{\sqrt{2}}$$

$$\Rightarrow (\cos \alpha \cos \alpha \cos \alpha)^2 = \frac{1}{8} \Rightarrow \cos \alpha = \pm \frac{1}{\sqrt{2}} \Rightarrow \alpha = \frac{\pi}{4} \text{ or } \frac{3\pi}{4}$$

$$\Rightarrow \frac{(\sin \alpha)^2}{(\cos \alpha)^2} = \frac{1}{4} \Rightarrow |\sin \alpha| = \frac{1}{2} \Rightarrow \sin \alpha = \pm \frac{1}{2} \Rightarrow \alpha = \frac{\pi}{6} \text{ or } \frac{5\pi}{6}$$

$$\Rightarrow \sin \alpha = -\sin \alpha \Rightarrow x = \frac{7\pi}{6} \text{ or } x = \frac{11\pi}{6}$$

$$\Rightarrow \sin \alpha = \sin \alpha \Rightarrow x = \frac{\pi}{6} \text{ or } x = \frac{5\pi}{6}$$

$$\tan(x) \tan(x) = 1 \Rightarrow \frac{\sin x}{\cos x} \propto \frac{\sin x}{\cos x} = 1 \Rightarrow \cos^2 x - \sin^2 x = 0 \Rightarrow \cos(2x) = 0$$

$$\Rightarrow \cos(2x) = 0 \Rightarrow 2x = k\pi + \frac{\pi}{2} \Rightarrow x = \frac{k\pi}{2} + \frac{\pi}{4}$$

$$\tan(x) = \frac{1}{\tan(x)} = \cot(x) = \tan(\frac{\pi}{2} - x) \Rightarrow x = \frac{\pi}{2} - x \Rightarrow 2x = \frac{\pi}{2} \Rightarrow x = \frac{\pi}{4}$$

$$\Rightarrow x = \frac{k\pi}{2} + \frac{\pi}{4} \Rightarrow \frac{k}{2} \mid \frac{\pi}{4} \mid \frac{1}{2} \Rightarrow \text{مجموع} = \frac{\pi + 3\pi + 5\pi + 7\pi}{4} = \frac{16\pi}{4} = 4\pi$$