

$$1 - \cos^2 x = \tan^2 x \leq 1 \rightarrow 1 - \cos^2 x \leq 1 + \tan^2 x \rightarrow 1 - \cos^2 x \leq 1 \rightarrow \cos^2 x \geq \frac{1}{2}$$

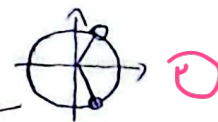
$$\downarrow$$

$$\cos x \geq \frac{1}{\sqrt{2}}$$

$$\downarrow$$

$$\cos x \neq 0$$

در بازه $[0, 2\pi]$ $x \in \left\{ \frac{\pi}{3}, \frac{5\pi}{3} \right\}$ $\leftarrow$ ۲ جواب دارد $\leftarrow$



$$\sin^2(x) + 2\cos(3x) = 1$$

$$\sin^2(x) = 1 - 2\cos(3x)$$

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

$$\cos^2(x) = 2\cos(3x)$$

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

$$\cos^2(x) = 8\cos^3(x) - 6\cos(x)$$

$$8\cos^3(x) - 6\cos(x) - \cos^2(x) = 0$$

$$\cos(x)(8\cos^2(x) - \cos(x) - 6) = 0$$

$$\cos(x) = 0 \rightarrow x = \frac{\pi}{2}, \frac{3\pi}{2}$$

$$8\cos^2(x) - \cos(x) - 6 = 0$$

$$(8\cos(x) + 6)(\cos(x) - 1) = 0$$

$$\cos(x) = 1 \rightarrow x = 2k\pi$$

بسیار بیشتر است $\downarrow$ ریشه ندارد

$$\cos(x) = -1 \rightarrow x = 2k\pi + \pi$$

$$x = \{-\pi, \pi\}$$

$$x \in [-\pi, \pi] \rightarrow$$

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

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

$$\downarrow$$

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

$$\sin^3 x = 1 \rightarrow x = 2k\pi + \frac{\pi}{2} \rightarrow x = \frac{2k\pi + \pi}{2}$$

$$\frac{\pi}{2} = \frac{10\pi}{4} = \text{جمله}$$

$$x = \left\{ \frac{\pi}{2}, \frac{5\pi}{2}, \frac{9\pi}{2} \right\}$$

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

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

$$\sin x \neq 0$$

$$\cos 2x \neq 0$$

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

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

$$\sin x = \frac{1}{2} \rightarrow x = \frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{11\pi}{6}$$

$$\tan 2x = \tan \frac{\pi}{3} = -\sqrt{3}$$

$$\cos(x + \frac{\pi}{4}) = \frac{1}{\sqrt{2}}$$

$$\downarrow$$

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

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

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

$$m(\cos x - \sin x) - \sqrt{2} \sin(2x) = \sqrt{2} \rightarrow \frac{1}{\sqrt{2}}m - 1 = 1 \rightarrow m = 4$$

$$\sin(x + \frac{\pi}{4}) \cos(x - \frac{\pi}{4}) = 1 \xrightarrow{x - \frac{\pi}{4} = t} \underbrace{\sin(t + \frac{\pi}{4})}_{\cos(t)} \cos(t) = 1 \rightarrow \cos^2(t) = 1$$

$$\downarrow$$

$$\cos(x - \frac{\pi}{4}) = \pm 1$$

$$\downarrow$$

$$x - \frac{\pi}{4} = k\pi$$

جواب ۲

$$\downarrow$$

$$x \in [0, 2\pi] \quad x = k\pi + \frac{\pi}{4}$$

$$\sin x + \sqrt{2} \cos x = \sqrt{2} \rightarrow \frac{1}{\sqrt{2}} \sin x + \cos x = 1$$

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

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

$$x = k\pi$$

$$\frac{9\pi}{4} = \frac{2\sqrt{2}\pi}{\sqrt{2}} = \dots$$

$$x = \left\{ -\frac{\pi}{4}, \frac{0\pi}{4}, \frac{2\pi}{4} \right\} \leftarrow x \in [-\pi, \pi] \quad x = k\pi - \frac{\pi}{4}$$

$$\sqrt{2} \sin x \sin(\frac{\pi}{4} - x) = 1 \rightarrow \sqrt{2} \sin x \cos x = -1 \rightarrow \sqrt{2} \sin 2x = -1 \rightarrow \sin 2x = -\frac{1}{\sqrt{2}}$$

$$\downarrow$$

$$2x = k\pi - \frac{\pi}{4}$$

$$x = k\pi - \frac{\pi}{8}$$

$$\frac{0\pi}{4} = \frac{0\pi}{4} = \dots$$

$$x = \left\{ \frac{11\pi}{8}, \frac{5\pi}{8}, \frac{13\pi}{8}, \frac{9\pi}{8} \right\} \leftarrow x \in [0, 2\pi] \quad x = k\pi - \frac{\pi}{8}$$

$$\frac{(1 + \cos(\gamma\alpha))(1 + \cos(\gamma\alpha))(1 + \cos(\gamma\alpha))}{\sqrt{2}\cos^3(\alpha)} = \frac{1}{\sqrt{2}}$$

$$\frac{\sin^3 \alpha \cdot \sqrt{2}\cos^3 \alpha \cdot \sqrt{2}\cos^3 \alpha \cdot \sqrt{2}\cos^3 \alpha}{\sin^3 \alpha} = \frac{1}{\sqrt{2}}$$

$$\sin \alpha \neq 0 \rightarrow \alpha \neq k\pi$$

$$\frac{1}{\sqrt{2}} \sin^3 \alpha = \frac{1}{\sqrt{2}} \rightarrow \sin^3 \alpha = \sin^2 \alpha \rightarrow \sin \alpha = \pm \sin^2 \alpha$$

$$\alpha = k\pi + \alpha \rightarrow \alpha = \frac{2k\pi}{3}, \frac{4k\pi}{3}, \frac{6k\pi}{3} \leftarrow \alpha = \left\{ \frac{\pi}{3}, \frac{2\pi}{3}, \dots, \frac{4\pi}{3}, \frac{5\pi}{3} \right\}$$

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

$$\tan(\gamma x) \tan(x) = 1$$

$$\downarrow$$

$$\frac{\sin(\gamma x) \sin(x)}{\cos(\gamma x) \cos(x)} = 1$$

$$\sin(\gamma x) \sin(x) = \cos(\gamma x) \cos(x) \rightarrow \cos(\gamma x) \cos(x) - \sin(\gamma x) \sin(x) = 0$$

$$\downarrow$$

$$\cos(\gamma x) = 0$$

$$\downarrow$$

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

$$x = \left\{ \frac{9\pi}{4}, \frac{11\pi}{4}, \frac{13\pi}{4}, \frac{15\pi}{4} \right\} \leftarrow x \in [\pi, 2\pi] \quad x = \frac{k\pi}{\gamma} + \frac{\pi}{2}$$

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