

سوال ۱) $\lambda \cos x - \tan^2 x = 1 \rightarrow \lambda \cos x = 1 + \frac{\sin^2 x}{\cos^2 x} \rightarrow \lambda \cos x = \frac{\cos^2 x + \sin^2 x}{\cos^2 x} \rightarrow \cos^2 x = \frac{1}{\lambda} \rightarrow \cos x = \frac{1}{\sqrt{\lambda}} \xrightarrow{[0, 2\pi]} x = \frac{\pi}{\sqrt{\lambda}}, \frac{5\pi}{\sqrt{\lambda}}$ جواب دارد ✓

سوال ۲) $5 \sin^2 x + 2 \cos^2 x = -2 \rightarrow 5(1 - \cos^2 x) + 2 \cos^2 x = -2 \rightarrow 5 \cos^2 x - 3 \cos^2 x - 4 \cos^2 x + 7 = 0 \xrightarrow{\cos x = t} 1t^2 - 3t^2 + 7 = 0$
 $t = -1 \rightarrow 1(-1) - 3(1) - 4(-1) + 7 = 0 \rightarrow \cos x = -1 \xrightarrow{[-\pi, \pi]} x = \pi, -\pi$ ✓

روش قرار دادن برابری $\cos x$ تعاد برابری ۱ است و این جواب داده
در بازه $[-\pi, \pi]$ تعاد ۲ جواب دارد

$$\frac{1t^2 - 3t^2 + 7}{1t^2 + 1t^2} \mid \frac{t+1}{1t^2 - 1t^2 + 7} \xrightarrow{\Delta < 0}$$

$$\frac{-13t^2 - 4t + 7}{-13t^2 - 13t^2}$$

$$\frac{4t + 7}{4t + 7}$$

$$\frac{4t + 7}{0}$$

سوال ۳) $2 \sin x \cos x + \sin x = 1 \rightarrow 2 \sin x (1 - \sin x) + \sin x = 1 \rightarrow 2 \sin x - 2 \sin^2 x + \sin x = 1 \rightarrow \sin^2 x = 1 \rightarrow x = \frac{\pi}{2} + k\pi \rightarrow x = \frac{\pi}{2} + k\pi$
 $[0, 2\pi] \rightarrow x = \frac{\pi}{2}, \frac{5\pi}{2}, \frac{3\pi}{2}$ جمع جواب ها: $\frac{\pi}{2} + \frac{5\pi}{2} + \frac{3\pi}{2} = \frac{9\pi}{2} = \frac{5\pi}{2}$ ✓

سوال ۴) $\frac{1}{\sin(\frac{\pi}{4} + 2x)} + \frac{1}{\cos(\frac{\pi}{4} + 2x)} = 0 \rightarrow \frac{1}{\cos 2x} - \frac{1}{\sin 2x} = 0 \rightarrow \cos 2x = \sin 2x \rightarrow \sin(\frac{\pi}{4} + 2x) = \sin 2x \rightarrow 2x = 2k\pi + \frac{\pi}{4} + 2\pi \rightarrow x = k\pi + \frac{\pi}{8}$
 $x = k\pi + \frac{\pi}{8} \rightarrow x = k\pi + \frac{\pi}{8} \xrightarrow{[0, 2\pi]} x = \frac{\pi}{8}, \frac{5\pi}{8}, \frac{9\pi}{8}, \frac{13\pi}{8}$
 $f(x) = 2k\pi + \pi - \frac{\pi}{4} - 2x \rightarrow 4x = 2k\pi + \frac{3\pi}{4} \rightarrow x = \frac{k\pi}{2} + \frac{3\pi}{8} \xrightarrow{[0, 2\pi]} x = \frac{\pi}{8}, \frac{5\pi}{8}, \frac{9\pi}{8}, \frac{13\pi}{8}$
 $\Rightarrow \alpha = \frac{5\pi}{12} - \frac{\pi}{12} = \frac{\pi}{3} \rightarrow \tan \alpha = \tan \frac{\pi}{3} = \sqrt{3}$

سوال ۵) $m(\cos x - \sin x) - 3\sqrt{4} \sin 2x = \sqrt{4} \rightarrow \cos(x + \frac{\pi}{4}) = \frac{\sqrt{3}}{2} \xrightarrow{\text{تبدیل ۲}} \cos^2(x + \frac{\pi}{4}) = \frac{1 + \cos(2x + \frac{\pi}{2})}{2} = \frac{1}{2} \rightarrow 1 - \sin 2x = \frac{1}{2} \rightarrow \sin 2x = \frac{1}{2}$
 $m(\cos x - \sin x) - 3\sqrt{4} \times \frac{1}{2} = \sqrt{4} \rightarrow m \times \sqrt{4} \times \sin(\frac{\pi}{4} - x) = 2\sqrt{4} \rightarrow m \times \sqrt{4} \times \cos(x + \frac{\pi}{4}) = 2\sqrt{4} \rightarrow m \times \sqrt{4} \times \frac{1}{\sqrt{2}} = 2\sqrt{4} \rightarrow m = 4$ ✓

سوال ۶) $\sin(x + \frac{\pi}{4}) \cos(x - \frac{\pi}{4}) = 1 \rightarrow \sin(x + \frac{\pi}{4}) \cos(\frac{\pi}{4} - x) = 1 \xrightarrow{\text{تبدیل ۲}} \sin^2(x + \frac{\pi}{4}) = 1 \rightarrow \sin(x + \frac{\pi}{4}) = \pm 1 \rightarrow x + \frac{\pi}{4} = k\pi + \frac{\pi}{4}$
 $\rightarrow x = k\pi + \frac{\pi}{4} \xrightarrow{[0, 2\pi]} x = \frac{\pi}{4}, \frac{5\pi}{4}$
 محدوده این بازه ۲ جواب دارد ✓

سوال ۷) $\sin x + \sqrt{3} \cos x = \sqrt{2} \rightarrow \frac{a}{|a|} \sqrt{a^2 + b^2} \sin(x + \alpha) \rightarrow \tan \alpha = \frac{b}{a} \rightarrow \tan \alpha = \sqrt{3} \rightarrow \alpha = \frac{\pi}{3} \rightarrow 2 \sin(x + \frac{\pi}{3}) = \sqrt{2} \rightarrow \sin(x + \frac{\pi}{3}) = \frac{\sqrt{2}}{2}$
 $\sin(x + \frac{\pi}{3}) = \sin \frac{\pi}{4} \rightarrow x + \frac{\pi}{3} = 2k\pi + \frac{\pi}{4} \rightarrow x = 2k\pi - \frac{\pi}{12} \xrightarrow{[-\pi, 2\pi]} x = -\frac{\pi}{12}, \frac{23\pi}{12}$
 $x + \frac{\pi}{3} = 2k\pi + \pi - \frac{\pi}{4} \rightarrow x = 2k\pi + \frac{11\pi}{12} \xrightarrow{[-\pi, 2\pi]} x = \frac{5\pi}{12}, \frac{17\pi}{12}$
 $\left. \begin{array}{l} x = -\frac{\pi}{12}, \frac{23\pi}{12} \\ x = \frac{5\pi}{12}, \frac{17\pi}{12} \end{array} \right\} \frac{23\pi}{12} + \frac{5\pi}{12} - \frac{\pi}{12} = \frac{27\pi}{12} = \frac{9\pi}{4}$ ✓

سوال ۸) $2 \sin x \sin(\frac{3\pi}{4} - x) = 1 \rightarrow 2 \sin x \cos x = -1 \rightarrow \sin 2x = -\frac{1}{2} \rightarrow 2x = 2k\pi + \frac{7\pi}{6} \rightarrow x = k\pi + \frac{7\pi}{12} \xrightarrow{[0, 2\pi]} x = \frac{7\pi}{12}, \frac{19\pi}{12}$
 $2x = 2k\pi + \frac{11\pi}{6} \rightarrow x = k\pi + \frac{11\pi}{12} \xrightarrow{[0, 2\pi]} x = \frac{11\pi}{12}, \frac{23\pi}{12}$
 $\rightarrow \frac{7\pi}{12} + \frac{11\pi}{12} + \frac{19\pi}{12} + \frac{23\pi}{12} = \frac{60\pi}{12} = 5\pi$ ✓

(سوال 9)

$$(1 + \cos^2 \alpha)(1 + \cos^2 \beta)(1 + \cos^2 \gamma) = \frac{1}{\lambda} \rightarrow (\cos^2 \alpha)(\cos^2 \beta)(\cos^2 \gamma) = \frac{1}{\lambda} \times \frac{\sin^2 \alpha}{\sin^2 \alpha}$$

$$\underbrace{\sin^2 \alpha (\cos^2 \beta)}_{\frac{1}{\lambda} \sin^2 \beta} \underbrace{(\cos^2 \gamma)}_{\frac{1}{\lambda} \sin^2 \gamma} \times \frac{1}{\sin^2 \alpha} = \frac{1}{\lambda} \rightarrow \sin^2 \alpha = \sin^2 \beta \rightarrow \sin \alpha = \sin \beta \rightarrow \alpha = \beta \text{ or } \alpha = \pi - \beta$$

$\alpha = \beta \rightarrow \alpha = \frac{\gamma k \pi}{q}$
 $\alpha = \pi - \beta \rightarrow \alpha = \frac{\gamma k \pi}{q} + \pi - \beta \rightarrow \alpha = \frac{\gamma k \pi}{q} + \frac{\pi}{q}$
 $\alpha = \pi - \beta \rightarrow \alpha = \frac{\gamma k \pi}{q} - \beta \rightarrow \alpha = \frac{\gamma k \pi}{q}$
 $\alpha = \pi - \beta \rightarrow \alpha = \frac{\gamma k \pi}{q} + \pi + \beta \rightarrow \alpha = \frac{\gamma k \pi}{q} + \frac{\pi}{q}$

$\alpha = \pi \leftarrow k = 3$

(سوال 10)

$$\tan^2 \theta \tan^2 \alpha = 1 \rightarrow \tan^2 \theta = \frac{1}{\tan^2 \alpha} \rightarrow \tan^2 \theta = \cot^2 \alpha \rightarrow \tan^2 \theta = \tan^2 \left(\frac{\pi}{2} - \alpha \right) \rightarrow \theta = k\pi + \frac{\pi}{2} - \alpha$$

$$\theta = k\pi + \frac{\pi}{2} \rightarrow \theta = \frac{k\pi}{2} + \frac{\pi}{2} \xrightarrow{[0, 2\pi]} \theta = \frac{9\pi}{2}, \frac{11\pi}{2}, \frac{13\pi}{2}, \frac{15\pi}{2} \rightarrow \frac{9\pi}{2} + \frac{11\pi}{2} + \frac{13\pi}{2} + \frac{15\pi}{2} = 4\pi$$

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$$1 + \cos^2 \alpha = \cos^2 \beta$$

$$\int 1 + \cos^2 \alpha = \cos^2 \beta$$

$$1 + \cos^2 \beta = \cos^2 \gamma$$

$$1 + \cos^2 \gamma = \cos^2 \alpha$$

$$\rightarrow \lambda \cos^2 \alpha \cos^2 \beta \cos^2 \gamma = \frac{1}{\lambda}$$

$$\cos^2 \alpha \cos^2 \beta \cos^2 \gamma = \frac{1}{4\lambda} \xrightarrow{\sqrt{\quad}} \cos \alpha \cos \beta \cos \gamma = \pm \frac{1}{\lambda} \xrightarrow{\times \sin \alpha} \sin \alpha \neq 0$$

$$\frac{(\sin \alpha \cos \alpha)}{\sin \alpha} \cos \beta \cos \gamma = \pm \frac{\sin \alpha}{\lambda} \rightarrow \frac{1}{\lambda} (\sin \alpha \cos \beta \cos \gamma) = \pm \frac{\sin \alpha}{\lambda}$$

$$\frac{1}{\lambda} \times \frac{1}{\lambda} (\sin \alpha \cos \beta \cos \gamma) = \pm \frac{\sin \alpha}{\lambda} \rightarrow \frac{1}{\lambda} \sin \alpha = \pm \frac{\sin \alpha}{\lambda}$$

$$\sin \alpha = \pm \sin \alpha \rightarrow \begin{cases} \alpha = \beta \text{ or } \alpha = \pi - \beta \\ \alpha = \gamma \text{ or } \alpha = \pi - \gamma \end{cases}$$

$$\begin{cases} \alpha = \beta \text{ or } \alpha = \pi - \beta \\ \alpha = \gamma \text{ or } \alpha = \pi - \gamma \end{cases}$$

$$\alpha = \frac{\gamma k \pi}{q} \xrightarrow{MANA} k = 3 \rightarrow n = \frac{4\pi}{q}$$

$$\alpha = \frac{\gamma k \pi}{q} \xrightarrow{MANA} k = 2 \rightarrow n = \frac{1\pi}{q}$$

$$\alpha = \frac{(\gamma k + 1) \pi}{q} \xrightarrow{MANA} k = 2 \rightarrow n = \frac{3\pi}{q}$$

$$\alpha = \frac{(\gamma k + 1) \pi}{q} \xrightarrow{MANA} k = 3 \rightarrow n = \frac{4\pi}{q}$$

$$\rightarrow MANA = \frac{1\pi}{q}$$

* A نمی تواند برابر خود باشد چون طبق * $\sin \alpha$ اصفاف صفر در نقطه ای است.