«آروین خالق زاده»

۱) الف)

$\underbrace{\cos 2x}_{1-2\sin^2 x} = 3\sin x - 1$

غ ق ق

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

$\Rightarrow 2\sin^2 x + 3\sin x - 2 = 0 \rightarrow \overbrace{\sin^2 x + 3\sin x - 4 = 0}$

$\sin x = \sin\frac{\pi}{6} \Rightarrow x = 2k\pi + \frac{\pi}{6}$

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

$\Rightarrow x = k\pi + (-1)^k \frac{\pi}{6}$

ب) $\cos 2x + \cos x - 2 = 2\cos^2 x + \cos x - 3 = 0 \Rightarrow \cos x = -\frac{3}{2}$ غ ق ق

$\cos x = 1$ ✓

$\cos x = \cos 0 \Rightarrow x = 2k\pi$

۲) الف) $\sin^4 x - \cos^4 x = \sin 4x \rightarrow \sin^2 x - \cos^2 x = 2\sin 2x\cos 2x \Rightarrow -\cos 2x = 2\sin 2x\cos 2x$

$\underbrace{(\sin^2 x + \cos^2 x)}_{1}(\sin^2 x - \cos^2 x) \quad \Rightarrow 2\sin 2x = -1 \Rightarrow \sin 2x = -\frac{1}{2}$

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

$\Rightarrow 2x = 2k\pi - \frac{\pi}{6} \Rightarrow x = k\pi - \frac{\pi}{12}$

$2x = 2k\pi + \frac{7\pi}{6} \Rightarrow x = k\pi + \frac{7\pi}{12}$

ب) $2\cos^2 x - 1 = -2\sin x\cos x \Rightarrow \cos 2x = -\sin 2x$

$\Rightarrow \cos x = -\sin x \xrightarrow{\text{در نقطه}}$  $\Rightarrow k\pi - \frac{\pi}{4} \Rightarrow \cos 2x = -\sin 2x \xrightarrow{\text{در نقطه}} \frac{k\pi}{2} - \frac{\pi}{8}$

۳) الف) $\frac{\cos x}{\sin x}(2\cos x + 1) = \frac{1}{\sin x} \Rightarrow 2\cos^2 x + \cos x - 1 = 0 \Rightarrow \cos x = -1 \Rightarrow x = 2k\pi + \pi$

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

$\Rightarrow x = 2k\pi \pm \frac{\pi}{3}$

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

ب) $2\sin^2 x - \sin x\cos x + \cos^2 x = 2 \Rightarrow \sin^2 x - \sin x\cos x = 1$

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

$\Rightarrow \cos x = 0 \Rightarrow x = 2k\pi \pm \frac{\pi}{2}$ یا

$\Rightarrow \cos x = -\sin x \Rightarrow x = k\pi - \frac{\pi}{4}$

«آروین خالق‌زاده»

۵) $\dfrac{\sin 4x + \sin 2x}{\sin 2x} = \sin^2 x + \cos^2 x \Rightarrow \dfrac{2\sin 2x \cos 2x + \cancel{\sin 2x}}{\cancel{\sin 2x}} = \sin^2 x + \cos^2 x$

$\Rightarrow 2\cos 2x + 1 = 1 \Rightarrow 2\cos 2x = 0$

$\Rightarrow 2x = 2k\pi \pm \frac{\pi}{2}$

$\Rightarrow x = k\pi \pm \frac{\pi}{4}$

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

$\xrightarrow{\div \sin^2 x} -\cos 3x = 1 \Rightarrow \cos 3x = -1 \Rightarrow 3x = 2k\pi + \pi$

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

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

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۱۰) الف)

$\underbrace{(\sin^2 x + \cos^2 x)}_{1}(\sin^2 x - \cos^2 x) = 1$

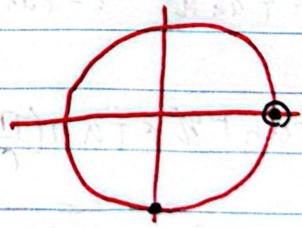
$\Rightarrow \sin^2 x - \cos^2 x = 1 \Rightarrow -\cos^2 x = 1 - \sin^2 x \Rightarrow \cos^2 x = -\cos^2 x$

$\Rightarrow \cos^2 x = 0 \Rightarrow \cos x = 0 \Rightarrow x = 2k\pi \pm \frac{\pi}{2} = k\pi + \frac{\pi}{2}$

ب) ← نقطه ندارد

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

$\sin^3 x = -1$, $\cos^3 x = 1 \Rightarrow \quad x = \left\{0, \frac{3\pi}{2}, 2\pi\right\}$



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۶) $\dfrac{\sin\frac{x}{2}}{1+\cos\frac{x}{2}} = \dfrac{1+\cos\frac{x}{2}}{\sin\frac{x}{2}} \xRightarrow{p.b} \sin^2\frac{x}{2} = \cos^2\frac{x}{2} + 2\cos\frac{x}{2} + 1 \quad \left[-\pi, \frac{3\pi}{2}\right]$ ۳

$\Rightarrow 1 - \cos^2\frac{x}{2} = \cos^2\frac{x}{2} + 2\cos\frac{x}{2} \Rightarrow 2\cos^2\frac{x}{2} + 2\cos\frac{x}{2} = 0$

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

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

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

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

$\Rightarrow \frac{x}{2} = 2k\pi + \pi \pm \frac{\pi}{3}$ ۱

$\Rightarrow \frac{x}{2} = 2k\pi + \frac{2\pi}{3} \Rightarrow x = 4k\pi + \frac{8\pi}{3}$

~~$\frac{x}{2} = 2k\pi + \pi$~~ ۳

$\Rightarrow x = 2k\pi + 2\pi$

$\frac{x}{2} = 2k\pi + \frac{4\pi}{3} \Rightarrow x = 4k\pi + [illegible]$ ۲

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۱، ۲، ۳، ۴ $\Rightarrow x = \{[illegible], -\pi, \pi, \frac{4\pi}{3}\}$

۶)

$$\frac{\sin\frac{x}{2}}{1+\cos\frac{x}{2}} = \frac{1}{\sin\frac{x}{2}} + \cot\frac{x}{2} \Rightarrow \frac{\sin\frac{x}{2}}{1+\cos\frac{x}{2}} = \frac{1+\cos\frac{x}{2}}{\sin\frac{x}{2}}$$

$$\Rightarrow \tan\frac{x}{4} = \frac{1}{\tan\frac{x}{4}} \Rightarrow \tan\frac{x}{4} = \cot\frac{x}{4} \Rightarrow \frac{x}{4} = \frac{k\pi}{2} + \frac{\pi}{4}$$

$$\Rightarrow x = 2k\pi + \pi \xrightarrow{x\in\left[-\pi, \frac{3\pi}{2}\right]} \{-\pi, \pi\} \Rightarrow |\pi - (-\pi)| = ((2\pi))$$

۹)

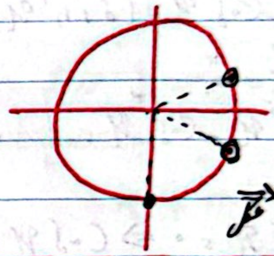
$$1 + \sin 2x = 2\cos^2 2x$$

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

$$\Rightarrow 2\sin^2 2x + \sin 2x - 1 = 0 \quad \sin 2x = -1, \quad \sin 2x = \frac{1}{2}$$

$x = [0, \pi]$

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



((۳ جواب))

۸)

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

$$\Rightarrow \tan 3x = \tan\left(\frac{\pi}{4} - x\right) \Rightarrow 3x = k\pi + \frac{\pi}{4} - x \Rightarrow \left(\left(x = \frac{k\pi}{4} + \frac{\pi}{16}\right)\right)$$

۴) الف)

$$\left(\frac{\sqrt{2}}{2}\cos x - \frac{\sqrt{2}}{2}\sin x\right)\left(\frac{\sqrt{2}}{2}\cos x + \frac{\sqrt{2}}{2}\sin x\right) = \frac{1}{2}\cos^2 x - \frac{1}{2}\sin^2 x = \frac{1}{4}$$

$$\Rightarrow \cos^2 x - \sin^2 x = \frac{1}{2} \Rightarrow 2\cos^2 x - 1 = \frac{1}{2} \Rightarrow \cos^2 x = \frac{3}{4} \Rightarrow \cos x = \frac{\sqrt{3}}{2}$$

$$\Rightarrow \left(\left(x = 2k\pi \pm \frac{\pi}{6}\right)\right)$$

ب)

$$\cos\left(2x - \frac{\pi}{9}\right) = -\sin 2x = \sin(-2x) = \cos\left(\frac{\pi}{2} + 2x\right)$$

$$\Rightarrow \begin{cases} 2x - \frac{\pi}{9} = 2k\pi + \frac{\pi}{2} + 2x \text{ غ ق ق} \\ 2x - \frac{\pi}{9} = 2k\pi - \frac{\pi}{2} - 2x \Rightarrow 4x = 2k\pi - \frac{7\pi}{18} \Rightarrow x = \frac{k\pi}{2} - \frac{7\pi}{72} \end{cases}$$