$\frac{9}{50}$

سؤال ①

الف) $1 - 2\sin^2 x = 3\sin x - 1$

$2\sin^2 x + 3\sin x - 2 = 0$ ($\sin^2 x = \alpha^2$ ، $\sin x = \alpha$)

خاطرنشان است

$\Delta = b^2 - 4ac = 9 - 4(2)(-2) = 25$

$\alpha = \frac{-b \pm \sqrt{\Delta}}{2a} = \frac{-3 \pm 5}{4}$ → $\frac{1}{2}$ ✓ ، -2 ✗

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

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

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۱ ب

ب) $\cos 2x + \cos x - 2 = 0$

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

$2\cos^2 x + \cos x - 3 = 0$

$\cos x = 1$ ✓ $\qquad x = 2k\pi$

$\cos x = -\frac{3}{2}$ ✗

---

۲ الف

$\sin^4 x - \cos^4 x = \sin 4x$

$(\sin^2 x - \cos^2 x)\underbrace{(\sin^2 x + \cos^2 x)}_{1} = \sin 4x$

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

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

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

$2x =$

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ب ۲

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

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

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

$$\tan 2x = -1$$

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

$$x = \frac{k\pi}{2} - \frac{\pi}{8}$$

ب ۱ ۲

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

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

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

$$\alpha$$

$$2\alpha^2 + \alpha - 1 = 0$$

$$x = k\pi$$

$$\Delta = b^2 - 4ac = 1 + 8 = 9$$

$$\alpha = \frac{-b \pm \sqrt{\Delta}}{2a} = \frac{-1 \pm 3}{4}$$

$$\alpha = \cos x = -1$$

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

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

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

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

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

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

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

$\tan x = -1 \qquad x = k\pi - \frac{\pi}{4}$

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

(مثال ۴)

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

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

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

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

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

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

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

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

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ب

$\frac{\sin 4m + \sin 2m}{\sin 2m} - \sin^2 m = \cos^2 m$

$\sin 2m$

$\frac{\sin 4m + \sin 2m}{\sin 2m} = 1$

$\frac{\sin 4m}{\sin 2m} + \frac{\sin 2m}{\sin 2m} = 1$

$\frac{\sin 4m}{\sin 2m} = 0 \longrightarrow \frac{2\sin 2m \cos 2m}{\sin 2m} = 0$

$2\cos 2m = 0 \longrightarrow \cos 2m = 0$

$2m = k\frac{\pi}{2} \longrightarrow m = k\frac{\pi}{4}$

(۱۰) الف) $\sin^4 x - \cos^4 x = 1$

$(\sin^2 x - \cos^2 x)(\sin^2 x + \cos^2 x) = 1$ ($\sin^2 x + \cos^2 x$ crossed out, marked 1)

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

$-\cos 2x = 1 \rightarrow \cos 2x = -1$

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

ب) $\sin^3 x - \cos^3 x = -1$

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

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

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

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(٤ الف)

$$\cos(\overset{\alpha}{2x} - \overset{\beta}{\tfrac{\pi}{9}}) = -\sin 2x$$

$$\cos 2x \cos(+\tfrac{\pi}{9}) + \sin 2x \sin(+\tfrac{\pi}{9}) = -\sin 2x$$

$$\cos 2x \cos(+\tfrac{\pi}{9}) = -\sin 2x \left(1 + \sin(+\tfrac{\pi}{9})\right)$$

$$\underbrace{\cos 2x}\cos\tfrac{\pi}{9} + \underbrace{\sin 2x}\sin\tfrac{\pi}{9} = -2\sin\tfrac{\pi}{9}\cos\tfrac{\pi}{9}$$

$$\downarrow \qquad\qquad \downarrow$$

$$(\cos^2 x - \sin^2 x)(\cos\tfrac{\pi}{9}) + (2\sin x\cos x)\sin\tfrac{\pi}{9}$$

(٤ الف)

$$\cos(\tfrac{\pi}{4} + x)\cos(x - \tfrac{\pi}{4}) = \tfrac{1}{4}$$

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

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

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

$$\cos^2 2x = \tfrac{1}{2} \qquad \cos 2x = +\tfrac{1}{2}$$

$$2x = 2k\pi \pm \tfrac{\pi}{3}$$

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

$$x =$$

$$x = k\pi \pm \tfrac{\pi}{6}$$

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شیرنگ:

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

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

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

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

$2\sin^2 2x + \sin 2x - 1 = 0$

$2\alpha^2 + \alpha - 1 = 0$ $\quad \alpha = -1$

$\alpha = \frac{1}{2}$

$\sin 2x = -1$ غلط

$\sin 2x = \frac{1}{2} \rightarrow \begin{cases} 2x = \frac{\pi}{3} \rightarrow x = \frac{\pi}{6} \\ 2x = \frac{5\pi}{6} \rightarrow x = \frac{5\pi}{12} \end{cases}$

$\begin{cases} 2x = \pi \end{cases}$