Subject: دوازدهم رشته B — کلاس ۲۱ — حسین ... پور
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۱) الف) $\cos 2x = 3\sin x - 1$

$1 - 2\sin^2 x - 3\sin x + 1 = 0 \Rightarrow -2t^2 - 3t + 2 = 0 \quad \Delta = 9 - 4\cdot(-2)\cdot 2 = 25$ $(+16)$

$\sin x = t$

$\alpha = \frac{\pi}{6}$

$x = \frac{3+5}{-4} = -2 = \sin x$ ✗ $\quad x = \frac{3-5}{-4} = \frac{1}{2} = \sin x \quad x = 2k\pi + \frac{\pi}{6},\ 2k\pi + \pi - \frac{\pi}{6}$

ب) $\cos 2x + \cos x - 2 = 0$

$2\cos^2 x - 1 + \cos x - 2 = 0 \xrightarrow{\cos x = t} 2t^2 + t - 3 = 0 \quad \Delta = 1 - 4(2)(-3) = 25$

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

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

$(\sin^2 x + \cos^2 x)(\sin^2 x - \cos^2 x) = \sin 4x$

$1 \qquad -\cos 2x \qquad 2\sin 2x \cdot \cos 2x \Rightarrow 2\sin 2x = -1$

$\sin 2x = \frac{-1}{2} \quad \alpha = -\frac{\pi}{6}$

$2x = 2k\pi - \frac{\pi}{6} \Rightarrow x = k\pi - \frac{\pi}{12} \qquad \cos 2x = 0$

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

$2x = 2k\pi + \pi - \frac{\pi}{6} \Rightarrow x = k\pi + \frac{7\pi}{12} \qquad 2x = 2k\pi \pm \frac{\pi}{2} \Rightarrow x = k\pi \pm \frac{\pi}{4}$

ب) $2\cos^2 x + 2\sin x \cdot \cos x = 1 \Rightarrow 2\cos^2 x - 1 + 2\sin x \cdot \cos x = 0$

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

$\sin(\frac{\pi}{2} - 2x) = \sin(-2x) \Rightarrow -2x = 2k\pi + \frac{\pi}{2} - 2x$ ✗

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

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

۳) الف) $\cot x\,(2\cos x + 1) = \frac{1}{\sin x} \Rightarrow \frac{\cos x}{\sin x}(2\cos x + 1) = \frac{1}{\sin x}$

$\alpha \neq \pi$

$2\cos^2 x + \cos x - 1 = 0 \xrightarrow{\cos x = t} 2t^2 + t - 1 = 0 \quad -1 = \cos x \Rightarrow x = 2k\pi + \pi$

$-\frac{c}{a}: \frac{1}{2} = \cos x \Rightarrow x = 2k\pi \pm \frac{\pi}{3}$

$\alpha = \frac{\pi}{3}$

ب) $2\sin^2 x - \sin x \cdot \cos x + \cos^2 x = 2$ $\quad (\sin^2 x + \sin^2 x)$

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

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

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

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

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

$k\pi + \frac{\pi}{2}$

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الف) $\cos\left(\frac{\pi}{3} + x\right)\cos\left(x - \frac{\pi}{4}\right) = \frac{1}{4}$

متمم: $\frac{\pi}{4} - x$ → $\sin\left(\frac{\pi}{4} + x\right)$

$\Rightarrow \frac{1}{2}\sin\left(\frac{\pi}{2} + 2x\right) = \frac{1}{4}$

$\cos 2x = \frac{1}{2}$ $\quad 2x = 2k\pi \pm \frac{\pi}{3}$

$\alpha = \frac{\pi}{3} \rightarrow x = k\pi \pm \frac{\pi}{6}$

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

$2x - \frac{\pi}{9} = 2k\pi + \frac{\pi}{2} + 2x$ ✗

$2x - \frac{\pi}{9} = 2k\pi - \frac{\pi}{2} - 2x \Rightarrow 4x = 2k\pi - \frac{7\pi}{18}$

$x = \frac{k\pi}{2} - \frac{7\pi}{72}$

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$\frac{\sin 4x + \sin 2x}{\sin 2x} = \cos^2 x + \sin^2 x = 1 \rightarrow \sin 4x + \sin 2x = \sin 2x$

$\sin 4x = 0 \quad 4x = k\pi \quad x = \frac{k\pi}{4}$

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

$\rightarrow \frac{2\sin\frac{x}{4}\cdot\cos\frac{x}{4}}{2\cos^2\frac{x}{4}} = \tan\frac{x}{4}$

$\frac{1 + \cos\frac{x}{2}}{\sin\frac{x}{2}} = \frac{2\cos^2\frac{x}{4}}{2\sin\frac{x}{4}\cdot\cos\frac{x}{4}} = \cot\frac{x}{4}$

$\tan\frac{x}{4} = \cot\frac{x}{4} = \tan\left(\frac{\pi}{2} - \frac{x}{4}\right)$

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

$x = 2k\pi + \pi$ → $k=0$: π; $k=-1$: $-\pi$

$|\pi - (-\pi)| = 2\pi$

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

$-\sin^2 x \cdot \cos 3x = 1 - \cos^2 x = \sin^2 x \Rightarrow -\sin^2 x \cdot \cos 3x - \sin^2 x = 0$

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

$\sin^2 x = 0$ → $k\pi$ → π, 2π

$\cos 3x = -1$

$3x = 2k\pi + \pi$

$x = \frac{2k\pi}{3} + \frac{\pi}{3}$ → $\frac{\pi}{3}$, π, $\frac{5\pi}{3}$

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

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

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

$4x = 2k\pi + \frac{\pi}{2} - 2x \rightarrow 6x = 2k\pi + \frac{\pi}{2}$

$x = \frac{k\pi}{3} + \frac{\pi}{12}$

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

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