آزمون نوری

$8\cos x = 1+\tan^2 x \qquad 8\cos x = \frac{1}{\cos^2 x} \qquad \cos^3 x = \frac{1}{8} \qquad \cos x = \frac{1}{2}$

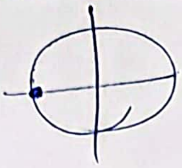
$x = \frac{\pi}{3} , \frac{5\pi}{3}$ → ۲ جواب

− $5(1-\cos^2 x) + 8\cos^3 x - 6\cos x = -2$

$5 - 5\cos^2 x + 8\cos^3 x - 6\cos x = -2 \qquad 8\cos^3 x - 5\cos^2 x - 6\cos x + 7 = 0$

$\hookrightarrow 8-6 = 7-5$

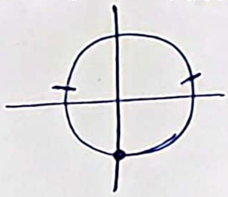
$\cos x = -1$



$x = \pi$

−۲ $2\sin x(1-2\sin^2 x) + \sin x = 1 \qquad 2\sin x - 4\sin^3 x + \sin x = 1$

$4\sin^3 x - 3\sin x + 1 = 0 \qquad \sin x = -1 , \frac{1}{2}$

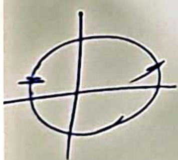


$x = \frac{\pi}{6} , \frac{5\pi}{6} , \frac{3\pi}{2}$

$\pi + \frac{3\pi}{2} = \frac{5\pi}{2}$

−۳ $\frac{1}{\sin(\frac{\pi}{2}+2x)} + \frac{1}{\cos(\frac{\pi}{2}+4x)} = 0 \longrightarrow \frac{1}{\cos 2x} - \frac{1}{\sin 4x} = 0 \qquad \frac{\sin 4x - \cos 2x}{\sin 4x \cos 2x} = 0$

$\sin 4x - \cos 2x = 0 \qquad 2\sin 2x\cos 2x - \cos 2x = 0 \qquad 2\sin 2x - 1 = 0 \qquad \sin 2x = \frac{1}{2}$



$2x = 2k\pi + \frac{\pi}{6} \longrightarrow x = k\pi + \frac{\pi}{12} \qquad \alpha = \frac{5\pi}{12} - \frac{\pi}{12} = \frac{4\pi}{12} = \frac{\pi}{3} = 60^\circ$

$2x = 2k\pi + \frac{5\pi}{6} \longrightarrow x = k\pi + \frac{5\pi}{12}$

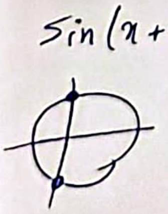
$\tan 120^\circ = -\sqrt{3}$

−۵ $\cos(x+\frac{\pi}{4}) = \cos x \times \frac{\sqrt{2}}{2} - \sin x \times \frac{\sqrt{2}}{2} = \frac{\sqrt{3}}{3} \qquad \frac{\sqrt{2}}{2}(\cos x - \sin x) = \frac{\sqrt{3}}{3}$

$\cos x - \sin x = \frac{\sqrt{3}}{3} \times \frac{2}{\sqrt{2}} = \frac{2\sqrt{3}}{3\sqrt{2}} = \frac{2\sqrt{6}}{6} = \frac{\sqrt{6}}{3} \qquad \frac{\sqrt{6}}{3} m - 3\sqrt{6}\sin 2x = \sqrt{6}$

$\frac{1}{3} m - 3\sin 2x = 1 \qquad \frac{1}{3} m = 3\sin 2x + 1 \qquad m = 9\sin 2x + 3$

−۶ $\sin(x+\frac{\pi}{4})\cos(\frac{\pi}{4}-x) = 1 \qquad \sin^2(x+\frac{\pi}{4}) = 1 \qquad \sin(x+\frac{\pi}{4}) = \pm 1$



$x + \frac{\pi}{4} = k\pi + \frac{\pi}{2} \qquad x = k\pi + \frac{\pi}{4}$ (۲ جواب دارد)

$\frac{1}{2}\sin x + \frac{\sqrt{3}}{2}\cos x = \frac{\sqrt{2}}{2} \rightarrow \sin\left(x + \frac{\pi}{3}\right) = \frac{\sqrt{2}}{2}$

$x + \frac{\pi}{3} = 2k\pi + \frac{\pi}{4} \rightarrow x = 2k\pi - \frac{\pi}{12}$

$x + \frac{\pi}{3} = 2k\pi + \frac{3\pi}{4} \rightarrow x = 2k\pi + \frac{5\pi}{12}$

$x = +\frac{5\pi}{12}, -\frac{\pi}{12}, \frac{23\pi}{12}$

$\frac{23\pi}{12} + \frac{5\pi}{12} = \frac{28\pi}{12}$ ✓

-۷ تریگونومتری

$-4\sin x\cos x = 1 \rightarrow 2\sin x\cos x = -\frac{1}{2}$ $\quad \sin 2x = -\frac{1}{2}$

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

$2x = 2k\pi - \frac{5\pi}{6} \rightarrow x = k\pi - \frac{5\pi}{12}$

$x = \frac{11\pi}{12}, \frac{23\pi}{12}, \frac{7\pi}{12}, \frac{19\pi}{12}$

$\frac{34\pi}{12} + \frac{29\pi}{12} = \frac{63\pi}{12} = 5\pi$ ✓

-۸

$\cos^2\alpha = \frac{1+\cos 2\alpha}{2} \rightarrow 1+\cos 2\alpha = 2\cos^2\alpha$

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

$\cos^2 4\alpha = \frac{1+\cos 8\alpha}{2} \rightarrow 1+\cos 8\alpha = 2\cos^2 4\alpha$

$\frac{1}{\sin\alpha}\left(\frac{1}{2}\sin 2\alpha\cos 2\alpha\cdot\cos 4\alpha\right) = \pm\frac{1}{8}$ $\quad \frac{1}{\sin\alpha}\left(\frac{1}{4}\sin 4\alpha\cos 4\alpha\right) = \pm\frac{1}{8}$

$\frac{\sin 8\alpha}{\sin\alpha} = \pm 1$ $\quad \sin 8\alpha = \pm\sin\alpha \rightarrow \sin 8\alpha = \sin\alpha$

$8\alpha = 2k\pi + \pi - \alpha \rightarrow 9\alpha = 2k\pi + \pi$

$8\alpha = 2k\pi + \alpha \rightarrow 7\alpha = 2k\pi$

$\alpha = \frac{2}{9}k\pi + \frac{\pi}{9}$

$\alpha = \frac{2}{7}k\pi$

$\sin 8\alpha = -\sin\alpha \rightarrow \sin 8\alpha = \sin(\pi+\alpha)$

$8\alpha = 2k\pi + \pi - \pi - \alpha$

$8\alpha = 2k\pi + \pi + \alpha$

$\alpha = \frac{2}{9}k\pi$ $\quad \alpha = \frac{2}{7}k\pi + \frac{\pi}{7}$

$\cos 8\alpha\cdot\cos 4\alpha\cdot\cos 2\alpha\cdot\cos\alpha = \frac{1}{8}$

$\cos\alpha\cdot\cos 2\alpha\cdot\cos 4\alpha = \pm\frac{1}{8}$

$\frac{1}{\sin\alpha}\left(\sin\alpha\cos\alpha\cdot\cos 2\alpha\cdot\cos 4\alpha\right) = \pm\frac{1}{8}$

-۹

Max =

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

$3x = k\pi + \frac{\pi}{2}$ $\quad x = \frac{k\pi}{3} + \frac{\pi}{6}$

$x = \frac{9\pi}{6}, \frac{11\pi}{6}, \frac{15\pi}{6}, \frac{19\pi}{6}$

$\frac{20\pi}{6} + \frac{28\pi}{6} = \frac{48\pi}{6} = 8\pi$ ✓

-۱۰