

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

سوال ۱

$$\rightarrow 2 \sin^2 x - 3 \sin x + 2 = 0 \quad \xrightarrow{\sin x = t} \quad 2t^2 - 3t + 2 = 0$$

روش اول $\rightarrow t^2 - 3t + 2 = (t-1)(t-2) = 0$

روش دوم $\rightarrow t^2 - 3t + 2 = 0 \quad \xrightarrow{\Delta = 9 - 8 = 1} \quad t = \frac{3 \pm 1}{2} = 2, 1$

$\sin x = -\frac{1}{2} = \sin\left(\frac{7\pi}{6}\right)$

$$\rightarrow x = 2K\pi + \frac{7\pi}{6}, \quad x = 2K\pi + \pi - \frac{7\pi}{6} = 2K\pi - \frac{\pi}{6}$$

ب) $\cos 2x + \cos x - 1 = 0 = 2 \cos^2 x + \cos x - 1 = 0 \quad \xrightarrow{\cos x = t} \quad 2t^2 + t - 1 = 0$

روش اول $\rightarrow t^2 + t - 1 = (t+1)(t-1) = 0$

روش دوم $\rightarrow t^2 + t - 1 = 0 \quad \xrightarrow{\Delta = 1 + 4 = 5} \quad t = \frac{-1 \pm \sqrt{5}}{2}$

$\cos x = 1 \rightarrow x = 2K\pi$

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

سوال ۲

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

$$\rightarrow \cos x = 0 \Rightarrow x = 2K\pi \pm \frac{\pi}{2} \rightarrow x = K\pi \pm \frac{\pi}{2}$$

$$\rightarrow \sin x = -\frac{1}{2} = \sin\left(\frac{7\pi}{6}\right) \rightarrow x = 2K\pi + \frac{7\pi}{6} \rightarrow x = K\pi + \frac{7\pi}{6}$$

$$\rightarrow x = 2K\pi + \pi - \frac{7\pi}{6} \rightarrow x = K\pi - \frac{\pi}{6}$$

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—) $r \cos^2 x + r \sin^2 x \cos x = 1 \rightarrow r \cos^2 x - 1 + r \sin^2 x \cos x = 0$

وال ٢

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

$\cos x = \cos\left(\frac{\pi}{2} + x\right) \rightarrow x = k\pi + \frac{\pi}{2} + x$ جواب —

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

الف) $\frac{\cos n}{\sin n} (r \cos n + 1) = \frac{1}{\sin n}$ $\text{مربع طرف} \rightarrow \sin n \neq 0$

ب) $\frac{1}{\sin n}$

$$\frac{1}{\sin n} (r \cos n + \cos n - 1) = 0 \rightarrow r \cos n + \cos n - 1 = 0 \rightarrow \frac{r-1}{r} = 1$$

$\cos n = -1 \rightarrow n = 2K\pi + \pi$ $\text{لأن } \cos \pi = -1 \rightarrow \sin n = 0$

$\cos n = \frac{1}{r} = \cos\left(\frac{\pi}{r}\right) \rightarrow n = 2K\pi \pm \frac{\pi}{r} \checkmark$

$$\checkmark) \sin^2 n + \sin^2 n + \cos^2 n = 1 + \sin n \cos n$$

مؤكد

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

$$\cos x = 0 \rightarrow x = [K\pi \pm \frac{\pi}{2}] \text{ و } -\sin x = \cos x \rightarrow x = K\pi - \frac{\pi}{2}$$

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ا) $\cos\left(\frac{\pi}{2} + u\right) \cdot \cos\left(x + \frac{\pi}{2} - \frac{\pi}{2}\right) = \frac{1}{r}$

سوال ۴

$$\rightarrow \cos\left(\frac{\pi}{2} + u\right) \times \sin\left(u + \frac{\pi}{2}\right) = \frac{1}{r} \sin\left(ru + \frac{\pi}{2}\right) = \frac{1}{r}$$

$$\sin\left(ru + \frac{\pi}{2}\right) = \frac{1}{r} \rightarrow ru + \frac{\pi}{2} = rK\pi + \frac{\pi}{2} \rightarrow u = K\pi - \frac{\pi}{2}$$

$$rx + \frac{\pi}{2} = rK\pi + \frac{\omega\pi}{2} \rightarrow x = K\pi + \frac{\pi}{2}$$

$$\text{—) } \cos\left(x_m - \frac{\pi}{9}\right) = \sin(-x_m) = \cos\left(\frac{\pi}{r} + x_m\right)$$

سوال ۵

$$\cancel{x_m} - \frac{\pi}{9} = 2K\pi + \frac{\pi}{r} + \cancel{x_m} \quad \text{جواب صحیح}$$

$$x_m - \frac{\pi}{9} = 2K\pi - \frac{\pi}{r} - x_m \rightarrow x_m = \frac{K\pi}{r} - \frac{v\pi}{vr}$$

$$\frac{\sin k_m + \sin k_n}{\sin k_m} = \cos k_n + \sin k_n = 1$$

$$\rightarrow \sin k_n + \sin k_m = \sin k_m \rightarrow \sin k_n = 0$$

$$\rightarrow k_m = k\pi \rightarrow n = \frac{k\pi}{\epsilon}$$

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

سوال 2

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

$$\rightarrow \tan \frac{x}{2} = \pm 1 \rightarrow \frac{x}{2} = k\pi + \frac{\pi}{2} \rightarrow x = 2k\pi + \pi$$

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

$$\rightarrow x = -\pi, \pi, 3\pi, \dots$$

مبارزه ذکر شده این دو را با هم $\rightarrow |\pi - (-\pi)| = 2\pi$

$$\cos^2 x - \sin^2 x \cos 2x = 1 \rightarrow \underbrace{\cos^2 x - 1}_{-\sin^2 x} - \sin^2 x \cos 2x = 0$$

سوال 3

$$\rightarrow \sin^2 x (1 + \cos 2x) = 0 \rightarrow \sin^2 x = 0 \rightarrow x = k\pi$$

$$1 + \cos 2x = 0 \rightarrow \cos 2x = -1 \rightarrow 2x = 2k\pi + \pi \rightarrow x = \frac{1}{2}2k\pi + \frac{\pi}{2}$$

$$\rightarrow x = \frac{\pi}{2}, \pi, \frac{3\pi}{2}, 2\pi, \dots \rightarrow \text{جواب}$$

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

سوال 1

$$\frac{\pi}{4} - x = rx + k\pi \rightarrow x = \frac{\pi}{1+r} - \frac{k\pi}{r}$$

$$\sqrt{1 + \sin rx} = \sqrt{r} \cos x \rightarrow 1 + \sin rx = r \cos^2 x = r - r \sin^2 x$$

سوال 2

$$\rightarrow r \sin^2 rx - \sin rx - 1 = 0 \rightarrow \sin rx = -1$$

$$\sin rx = -1 \rightarrow rx = rK\pi - \frac{\pi}{2} \rightarrow x = K\pi - \frac{\pi}{r} \quad \left(\sin rx = \frac{1}{r} \right)$$

$$\frac{\pi}{2} \leq x \leq \pi \rightarrow x = \frac{r\pi}{r}$$

$$\sin rx = \frac{1}{r} = \sin\left(\frac{\pi}{4}\right) \rightarrow rx = rK\pi + \frac{\pi}{4}, \quad rx = rK\pi + \frac{3\pi}{4}$$

$$x = \frac{\pi}{1+r} \vee x = \frac{3\pi}{1+r} \quad \left(\frac{\pi}{2} \leq x \leq \pi \right) \quad x = K\pi + \frac{\pi}{1+r} \quad x = K\pi + \frac{3\pi}{1+r}$$

$$\hookrightarrow \text{قوله} \xrightarrow{\text{و}} x = \frac{3\pi}{1+r} \rightarrow \text{لا يمكن} \quad \times$$

سوال ۱۰

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

کانونه / جواب

$$\frac{\pi}{2} (0, 1) \rightarrow 1 - 0 = -1 \quad \times$$

$$\pi \rightarrow (-1, 0) \rightarrow 0 + 1 = -1 \quad \times$$

$$\frac{3\pi}{2} (0, -1) \rightarrow -1 - 0 = -1 \quad \checkmark$$

$$2\pi (1, 0) \rightarrow 0 - 1 = -1 \quad \checkmark$$

در بازه $[0, 2\pi]$ جواب دارد
 $\rightarrow 0, \pi, \frac{3\pi}{2}$