

$$\text{الف) } \sin^4 x - \cos^4 x = \sin 4x$$

$$\frac{(\sin^2 x - \cos^2 x)(\sin^2 x + \cos^2 x)}{-\cos 2x} = \sin 4x \rightarrow \sin 4x = -\cos 2x$$

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

$$\text{جواب ۱) } 4x = 2k\pi + 2x - \frac{\pi}{2} \Rightarrow x = k\pi - \frac{\pi}{4}$$

$$\text{۲) } 4x = 2k\pi + \pi - (2x - \frac{\pi}{2}) \Rightarrow x = \frac{k\pi}{3} + \frac{\pi}{4}$$

$$\text{ب) } 2\cos^2 x + 2\sin x \cos x = 1 \rightarrow 1 + \cos 2x + \sin 2x = 1 \rightarrow \cos 2x + \sin 2x = 0$$

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

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

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

کلن ۱۶

کلاس : دوازدهم فتر A

نام : عین رضائی

$$\text{الف) } \cos 2x = 3\sin x - 1 \rightarrow 1 - 2\sin^2 x = 3\sin x - 1$$

$$2\sin^2 x + 3\sin x - 2 = 0 \rightarrow \left(\sin x - \frac{1}{2}\right)(\sin x + 2)$$

$$\sin x = -2 \text{ غیر قابل قبول}$$

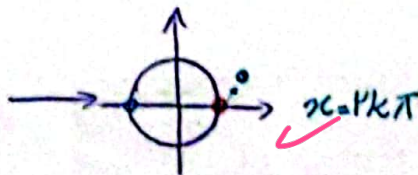
$$\sin x = \frac{1}{2} \rightarrow 2k\pi + \frac{\pi}{6} \quad 2k\pi + \frac{5\pi}{6}$$

$$\text{ب) } \cos 2x + \cos x = 2$$

این به معادله انتیم (OPT) به نام معروف است $a \sin^n \theta + b \cos^m \theta = C$ که اگر $C = |a| + |b|$ باشد.

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

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



جواب سوال ۶

۱. $\sin \frac{x}{y}$

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

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

$$\begin{cases} \cos \frac{x}{y} = 0 & \frac{\cos x = 0}{x = k\pi + \frac{\pi}{y}} \\ x = yk\pi + \pi & \text{①} \\ \cos \frac{x}{y} = -1 & \frac{\cos x = -1}{x = yk\pi + \pi} \\ x = yk\pi + y\pi & \end{cases}$$

این توابع بازه $[-\pi, \frac{y\pi}{y}]$ جای نمیده

جواب ① $(yk\pi + \pi)$ توابع بازه $[-\pi, \frac{y\pi}{y}]$ دوتا جواب $-\pi$ و π میدهد

قد مطلق صاف

$$\begin{aligned} |-\pi - (-\pi)| &= y\pi \\ |-\pi - \pi| &= y\pi \end{aligned} \rightarrow y\pi \rightarrow \text{جواب آخر}$$

$$\sqrt{1 + \sin 2x} = \sqrt{2} \cos 2x \xrightarrow{\text{توان}} 1 + \sin 2x = \frac{y \cos^2 2x}{y - y \sin^2 2x}$$

جواب سوال ۹

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

$$\sin 2x = -1 = \sin \frac{y\pi}{y} \rightarrow x \begin{cases} k\pi + \frac{y\pi}{y} \\ k\pi - \frac{y\pi}{y} \end{cases} \rightarrow \text{توابع بازه } [0, \pi] \text{ میدهد } (\frac{y\pi}{y})$$

$$\sin 2x = \frac{1}{y} = \sin \frac{\pi}{y} \rightarrow x \begin{cases} k\pi + \frac{\pi}{y} \\ k\pi + \frac{5\pi}{y} \end{cases} \rightarrow \text{توابع بازه } [0, \pi] \text{ میدهد } (\frac{\pi}{y} \text{ و } \frac{5\pi}{y})$$

در مجموع معادله ۳ جواب دارد! حال سه تا جواب رو تو معادله اولی جای کنیم:

$$\textcircled{1} \frac{y\pi}{y} \rightarrow \sqrt{1 + \sin \frac{y\pi}{y}} = \sqrt{2} \cos \frac{y\pi}{y} \rightarrow 0 = 0 \checkmark$$

$$\textcircled{5} \frac{5\pi}{y} \rightarrow \sqrt{\frac{y}{y}} \neq \frac{\sqrt{y}}{y} \times$$

$$\textcircled{3} \frac{\pi}{y} \rightarrow \sqrt{\frac{y}{y}} = \frac{\sqrt{y}}{y} \checkmark$$

جواب آخر

دوتا جواب باقی قبول داریم

اگر $\cos x = -1$ باشد $\sin x = 0$ است و عبارت تقریباً معصوم می شود

جواب سوال ۳

۱، ۷۵

$x \sin$

پس جواب غیر قابل قبول مصوب می شود

$$\text{الف) } (\cot x (\cos x + 1) = \frac{1}{\sin x}) \rightarrow \cos x (\cos x + 1) = 1 \rightarrow$$

$$\cos^2 x + \cos x - 1 = 0 \rightarrow \begin{cases} \cos x = -1 \rightarrow 2k\pi + \pi = x \\ \cos x = \frac{1}{2} \rightarrow 2k\pi \pm \frac{\pi}{3} = x \end{cases}$$

$$\text{ب) } 2\sin^2 x + \cos^2 x - \sin x \cos x = 2 \xrightarrow{\substack{a=d \\ \div \sin^2 x}} 2 + \cot^2 x - \cot x = 2(1 + \cot^2 x)$$

$$\cot^2 x + \cot x = 0 \rightarrow \cot x (\cot x + 1) = 0$$

$$\rightarrow \begin{cases} \cot x = 0 \rightarrow x = k\pi + \frac{\pi}{2} \\ \cot x = -1 \rightarrow x = k\pi - \frac{\pi}{4} \end{cases}$$

عین مناسبت

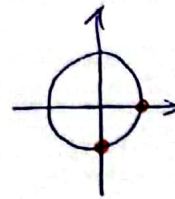
$$\text{الف) } \sin^4 x - \cos^4 x = 1$$

$$\left\{ \begin{array}{l} x = \frac{\pi}{2} \rightarrow x = 2k\pi + \frac{\pi}{2} \\ x = -\frac{\pi}{2} \rightarrow x = 2k\pi - \frac{\pi}{2} \end{array} \right\} \rightarrow k\pi + \frac{\pi}{2}$$

جواب ها: $\frac{\pi}{2}$ و $\frac{3\pi}{2}$

$$\text{ب) } \sin^3 x - \cos^3 x = -1$$

$$\left\{ \begin{array}{l} 0, 2\pi = x \rightarrow x = 2k\pi \\ -\frac{\pi}{2} = x \rightarrow x = 2k\pi - \frac{\pi}{2} \end{array} \right\} \rightarrow$$



جواب ها: 0 و 2π و $\frac{3\pi}{2}$

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

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

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

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

جواب سوال ۷

ساده سازی معادله

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

$$-\sin^2 x (\cos^3 x + 1) = 0 \Rightarrow \left\{ \begin{array}{l} \sin^2 x = 0 \rightarrow \text{دربازه } [0, 2\pi] \leftarrow \text{صفر} - \pi - 2\pi \\ \cos^3 x = -1 \Rightarrow \end{array} \right.$$

$$\cos^3 x = -1 \Rightarrow 3x = 2k\pi + \pi \Rightarrow x = \frac{2k\pi}{3} + \frac{\pi}{3} \quad \begin{array}{l} \text{جواب ها در} \\ [0, 2\pi] \end{array}$$

$$\frac{\pi}{3}, \pi, \frac{5\pi}{3} \leftarrow \text{در کل معادله ۳ جواب دارد} \leftarrow \left\{ \frac{\pi}{3}, 0, \frac{\pi}{3}, \pi, \frac{5\pi}{3} \right\}$$

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سوال ۳ سمت الف

$$\cos(-n) = \cos n$$

$$\cos\left(\frac{\pi}{2} + n\right) \cos\left(n - \frac{\pi}{2}\right) = \frac{1}{2} = \cos\left(\frac{\pi}{2} + n\right) \cos\left(\frac{\pi}{2} - n\right) = \frac{1}{2}$$

$$\text{if } \alpha + \beta = \frac{\pi}{2} \rightarrow \cos \alpha = \sin \beta \rightarrow \cos\left(\frac{\pi}{2} + n\right) \sin\left(\frac{\pi}{2} + n\right) = \frac{1}{2}$$

$$\frac{1}{2} \sin\left(\frac{\pi}{2} + n\right) = \frac{1}{2} \rightarrow \cos n = \frac{1}{2} \rightarrow n = k\pi \pm \frac{\pi}{2}$$

$$n = k\pi \pm \frac{\pi}{2}$$

$$\cos\left(n - \frac{\pi}{2}\right) = -\sin n$$

سوال ۴ سمت ب

$$\cos\left(n - \frac{\pi}{2}\right) = \cos\left(\frac{\pi}{2} + n\right)$$

$$n - \frac{\pi}{2} = k\pi \pm \left(\frac{\pi}{2} + n\right) \rightarrow k\pi + \frac{\pi}{2} + \frac{\pi}{2} = 0 \quad \times$$

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

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

$$\tan \frac{\pi}{2} = 1 \rightarrow \frac{1 - \tan n}{1 + \tan n} = \tan\left(\frac{\pi}{2} - n\right)$$

سوال ۵

$$\tan\left(\frac{\pi}{2} - n\right) = \tan n \rightarrow \frac{\pi}{2} - n = k\pi + n$$

$$-n = k\pi - \frac{\pi}{2} \xrightarrow{-k\pi = k\pi} n = k\pi + \frac{\pi}{2}$$

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