سلام خسته نباشید

با توجه به اینکه هفته قبل تکالیف را اشتباهی
بارگزاری کردم. اینهفته تکالیف سری ۱۶ و ۱۷
را با هم بارگزاری کردم. لطفا اگر برای شما
مقدور است تکالیف سری ۱۶ هم برای من
تصحیح کنید و نمره اش را ثبت کنید. متشکرم

نام و نام خانوادگی علی رضا نوروزی پاسخنامه تشریحی تکلیف شماره 14 کلاس A (شنبه)

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

$\sin^2 x + 3\sin x - 4 = 0 \begin{cases} \sin x = -2 \ \times \\ \sin x = \frac{1}{2} \longrightarrow x = 2k\pi + \frac{\pi}{6} \quad x = 2k\pi + \pi - \frac{\pi}{6} \end{cases}$ ۱

ب) $\cos^2 x - \sin^2 x + \cos x - 2 = 0 \longrightarrow 2\cos^2 x + \cos x - 3 = 0$

$a+b+c=0 \begin{cases} \cos x = +1 \\ \cos x = \frac{-3}{2} \ \times \end{cases} \longrightarrow x = 2k\pi$

الف) $\cos(2x) = -\sin(4x) \longrightarrow \cos(2x) = -2\sin(2x)\cos(2x)$

$\begin{cases} \cos(2x) = 0 \longrightarrow 2x = k\pi + \frac{\pi}{2} \longrightarrow x = \frac{k\pi}{2} + \frac{\pi}{4} \\ \sin(2x) = \frac{-1}{2} \longrightarrow 2x = 2k\pi - \frac{\pi}{6} \quad 2x = 2k\pi + \pi + \frac{\pi}{6} \end{cases} \leftrightarrow \begin{matrix} x = k\pi - \frac{\pi}{12} \\ x = k\pi + \frac{5\pi}{12} \end{matrix}$

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

$\tan(2x) = -1 \longrightarrow 2x = k\pi - \frac{\pi}{4} \longrightarrow x = \frac{k\pi}{2} - \frac{\pi}{8}$

الف) $\frac{\cos x}{\sin x}(2\cos x + 1) = \frac{1}{\sin x} \longrightarrow 2\cos^2 x + \cos x - 1 = 0 \begin{cases} \cos x = -1 \\ \cos x = \frac{1}{2} \end{cases}$

$x = 2k\pi + \pi \qquad x = 2k\pi \pm \frac{\pi}{3}$ ۳

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

$\sin(2x) + \cos(2x) = -1 \longrightarrow \frac{2\tan(x) + 1 - \tan^2(x)}{1+\tan^2(x)} = -1 \longrightarrow \tan(x) = -1 \longrightarrow x = k\pi - \frac{\pi}{4}$

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

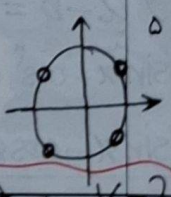
$\frac{1}{2}\cos^2 x - \frac{1}{2}\sin^2 x = \frac{1}{4} \longrightarrow \cos(2x) = \frac{1}{2} \longrightarrow 2x = 2k\pi \pm \frac{\pi}{3} \longrightarrow x = k\pi \pm \frac{\pi}{6}$ ۴

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

$\hookrightarrow 2x - \frac{\pi}{9} = 2k\pi - 2x - \frac{\pi}{2} \longrightarrow x = \frac{k\pi}{2} - \frac{7\pi}{72}$

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

$\cos(2x) = 0 \longrightarrow 2x = k\pi + \frac{\pi}{2} \longrightarrow x = \frac{k\pi}{2} + \frac{\pi}{4}$ ۵



ج.ب $= \left\{\frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}\right\}$

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

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

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

$$\begin{cases}\cos\left(\frac{x}{2}\right)=0\\ \cos\left(\frac{x}{2}\right)=-1\end{cases}$$

(الف)

$$x_1=2k\pi+\pi \qquad x_2=4k\pi+2\pi\longrightarrow |x_2-x_1|=2k\pi+\pi$$

$$1-\sin^2 x-\sin^2 x\cos^2 x=1\longrightarrow \sin^2 x\left(1+\cos^2 x\right)=0$$

$$\sin^2 x=0\longrightarrow \sin x=0\longrightarrow x=k\pi\longrightarrow \text{۲ جواب}$$

$$\cos^2 x=-1\longrightarrow 2x=2k\pi+\pi\longrightarrow x=\frac{2k\pi}{2}+\frac{\pi}{2}\longrightarrow \text{۲ جواب}$$

جمعاً معادله در بازه $[0,2\pi]$ دارای ۴ جواب است.

$$\tan\left(\frac{\pi}{4}-x\right)=\tan(2x)\longrightarrow \frac{\pi}{4}-x=k\pi+2x\longrightarrow x=\frac{-k\pi}{4}+\frac{\pi}{12}$$

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

روش ۲

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

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

$$\sin(2x)=-1\longrightarrow x=k\pi-\frac{\pi}{4}$$

$$\sin(2x)=\frac{1}{2}\longrightarrow \begin{cases}x=k\pi+\frac{\pi}{12}\\ x=k\pi+\frac{5\pi}{12}\end{cases}$$

جمعاً در بازه $[0,\pi]$ دارای ۴ جواب است.

ب) $-\cos(2x)=1\longrightarrow \cos(2x)=-1\longrightarrow 2x=2k\pi+\pi$

$$x=k\pi+\frac{\pi}{2}\longrightarrow x=\frac{\pi}{2},\frac{3\pi}{2}$$

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

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۱

$$\Lambda\cos x-\frac{\sin^{۲}x}{\cos^{۲}x}=۱\rightarrow\frac{\Lambda\cos^{۳}x-\sin^{۲}x}{\cos^{۲}x}=۱\rightarrow\Lambda\cos^{۳}x=\sin^{۲}x+\cos^{۲}x$$

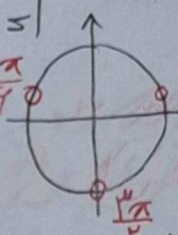
$$\cos x=\frac{۱}{۲}\rightarrow x=۲k\pi\pm\frac{\pi}{۳}\rightarrow$$ ۲ جواب ✓

۲

$$\cos(۲x)=۱-۲\sin^{۲}(x)\rightarrow۲\sin(x)\left(۱-۲\sin^{۲}(x)\right)+\sin(x)=۱$$

$$۲\sin(x)-۴\sin^{۳}(x)+\sin(x)=۱\rightarrow\sin(۳x)=۱$$

$$۳x=۲k\pi+\frac{\pi}{۲}\rightarrow x=\frac{۲k\pi}{۳}+\frac{\pi}{۶}$$



$$\oplus\rightarrow\frac{۵\pi_{۳}}{۲}$$

$$\frac{۱}{\sin\left(\frac{\pi}{۲}+۲x\right)}+\frac{۱}{\cos\left(\frac{\pi}{۲}+۴x\right)}=۰\rightarrow\frac{۱}{\cos(۲x)}=\frac{۱}{\sin(۴x)}$$

$$\cos(۲x)=۲\sin(۲x)\cos(۲x)\rightarrow\sin(۲x)=\frac{۱}{۲}\ /\ \cos(۲x)=۰$$

$$x=\frac{۳\pi}{۴}\quad x=\frac{\pi}{۴}\quad x=\frac{\pi}{۱۲}\quad x=\frac{۵\pi}{۱۲}$$

$x=x_{۲}$ — $x_{۱}$:

$$\frac{۳\pi}{۴}-\frac{۵\pi}{۱۲}=\frac{\pi}{۳}\rightarrow\tan\left(\frac{۲\pi}{۳}\right)=-\sqrt{۳}$$

$$\frac{\pi}{۴}-\frac{\pi}{۱۲}=\frac{\pi}{۶}\rightarrow\tan\left(\frac{\pi}{۳}\right)=\sqrt{۳}$$

$$\cos\left(x+\frac{\pi}{۴}\right)=\frac{۱}{\sqrt{۳}}\xrightarrow{\text{توان ۲}}\frac{۱+\cos\left(\frac{\pi}{۲}+۲x\right)}{۲}=\frac{۱}{۳}\rightarrow-\sin(۲x)=\frac{-۱}{۳}\rightarrow\sin(۲x)=\frac{۱}{۳}$$

$$m(\cos x-\sin x)-\frac{۳\sqrt{۶}}{۳}=\sqrt{۶}\rightarrow\sin x-\cos x=\frac{۲\sqrt{۶}}{-m}\rightarrow\sqrt{۲}\sin\left(x-\frac{\pi}{۴}\right)=\frac{۲\sqrt{۶}}{-m}$$

توان ۲ ←

$$\sin^{۲}\left(x-\frac{\pi}{۴}\right)=\frac{۱۲}{m^{۲}}\rightarrow\frac{۱-\cos\left(\frac{\pi}{۲}-۲x\right)}{۲}=\frac{۱۲}{m^{۲}}\rightarrow\frac{۱-\sin(۲x)}{۲}=\frac{۱۲}{m^{۲}}$$

$$\frac{۱}{۳}=\frac{۱۲}{m^{۲}}\rightarrow m^{۲}=۳۶\rightarrow m=\pm۶$$

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

$$\left(\frac{\sqrt{3}}{2}\sin x+\frac{1}{2}\cos x\right)^2=1 \quad \frac{a}{|a|}\sqrt{a^2+b^2}\sin(x+\alpha) \rightarrow \left(\sin\left(x+\frac{\pi}{4}\right)\right)^2=1$$

$$\sin\left(x+\frac{\pi}{4}\right)=1 \longrightarrow x+\frac{\pi}{4}=2k\pi+\frac{\pi}{2} \rightarrow x=2k\pi+\frac{\pi}{3} \rightarrow \frac{\pi}{3}=x \rightarrow \text{جواب}$$

$$\sin\left(x+\frac{\pi}{4}\right)=-1 \longrightarrow x+\frac{\pi}{4}=2k\pi-\frac{\pi}{2} \rightarrow x=2k\pi-\frac{3\pi}{3} \rightarrow \frac{-3\pi}{3}=x$$

$$a\sin x+b\cos x=\frac{a}{|a|}\sqrt{a^2+b^2}\sin(x+\alpha)$$

$$\sin x+\sqrt{3}\cos x=\sqrt{2} \rightarrow \sqrt{4}\sin\left(x+\frac{\pi}{3}\right)=\sqrt{2} \rightarrow \sin\left(x+\frac{\pi}{3}\right)=\frac{\sqrt{2}}{2}$$

$$\begin{cases} x+\frac{\pi}{3}=2k\pi+\frac{\pi}{4} \longrightarrow x=2k\pi-\frac{\pi}{12} \\ x+\frac{\pi}{3}=2k\pi+\pi-\frac{\pi}{4} \rightarrow x=2k\pi+\frac{5\pi}{12} \end{cases} \quad x\in[-\pi,2\pi] \rightarrow \frac{-\pi}{12}\,/\,\frac{5\pi}{12}\,/\,\frac{23\pi}{12}$$

$$\frac{27\pi}{12} \quad \oplus$$

$$\sin\left(\frac{3\pi}{2}-x\right)=-\cos x \longrightarrow 4\sin x\cos x=-1 \rightarrow 2\sin(2x)=-1$$

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

$$\begin{cases} 2x=2k\pi-\frac{\pi}{6} \longrightarrow x=k\pi-\frac{\pi}{12} \rightarrow x=\frac{-\pi}{12},\frac{11\pi}{12} \\ 2x=2k\pi+\pi+\frac{\pi}{6} \rightarrow x=k\pi+\frac{7\pi}{12} \rightarrow x=\frac{7\pi}{12},\frac{19\pi}{12} \end{cases} \quad \oplus \rightarrow 3\pi$$

$$\cos^2(x)=\frac{1+\cos 2x}{2} \longrightarrow 8\cos^2(x)\cos^2(2x)\cos^2(4x)=\frac{1}{8} \rightarrow \text{جذر}$$

$$\cos(x)\cos(2x)\cos(4x)=\frac{1}{8} \rightarrow \text{حاصل ضرب کسینوس‌ها}$$

$$x=\frac{\pi}{3},\frac{-\pi}{3} \quad x=\frac{\pi}{4},\frac{-\pi}{4} \quad x=\frac{\pi}{12},\frac{-\pi}{12}$$

$$A=\left\{\pm\frac{\pi}{3},\pm\frac{\pi}{4},\pm\frac{\pi}{12}\right\} \rightarrow Max_A=\frac{\pi}{3}$$

$$\tan(3x)=\frac{1}{\tan(x)} \longrightarrow \cot\left(\frac{\pi}{2}-3x\right)=\cot(x) \rightarrow \frac{\pi}{2}-3x=k\pi+x$$

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

$$k=0 \rightarrow \frac{\pi}{8}$$

$$k=1 \rightarrow \frac{-\pi}{8}$$

$$\oplus \rightarrow \frac{-10\pi}{8}=\frac{-5\pi}{4}$$

$$k=2 \longrightarrow \frac{-\pi}{2}+\frac{\pi}{8}$$

$$k=3 \longrightarrow \frac{-3\pi}{4}+\frac{\pi}{8}$$

$$k=4 \longrightarrow -\pi+\frac{\pi}{8}$$