Subject:
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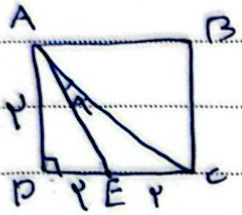
۱- $S=\frac{1}{2}ab\sin\alpha \rightarrow 6\sqrt{3}=\frac{1}{2}\times\sqrt{3}\times 8\times\sin\alpha$

$\sin\alpha=\frac{\sqrt{3}}{2}$ $\begin{cases}\alpha=60^\circ & \frac{120}{60}=2\\ \alpha=120^\circ\end{cases}$

۲-



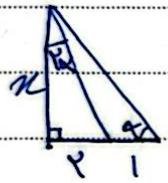
$AE^2=8 \quad AE=2\sqrt{2} \quad AC=2\sqrt{10}$

$EC^2=AC^2+AE^2-2AC\,AE\cos\alpha$

$4=8+40-8\sqrt{10}\cos\alpha$

$\Rightarrow\cos\alpha=\frac{3}{\sqrt{10}} \Rightarrow \sin\alpha=\frac{1}{\sqrt{10}} \Rightarrow \cot\alpha=3$

۳-

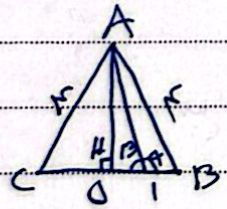


$\cot\alpha=\frac{3}{x} \quad \cot 2\alpha=\frac{x}{2}$

$\cot 2\alpha=\frac{\cot^2\alpha-1}{2\cot\alpha} \Rightarrow \frac{x}{2}=\frac{\frac{9-x^2}{x^2}}{\frac{6}{x}} \Rightarrow x=\frac{3}{2}$

$\cot\alpha=\frac{3}{\frac{3}{2}}=2$

۴-



$AH=\sqrt{16-9}=\sqrt{7}$

$\tan(\pi-\alpha)=-\tan\alpha=\frac{\sqrt{7}}{2} \Rightarrow \tan\alpha=-\frac{\sqrt{7}}{2}$

$2\sin^2x-\cos^2x=\sin^2x+1=\frac{5}{3} \Rightarrow \sin^2x=\frac{1}{3}, \cos^2x=\frac{2}{3}$ -۵

$\tan 2x+1=\frac{1}{\cos^2x} \Rightarrow \tan^2x=\frac{3}{2}-1=\frac{1}{2}$

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

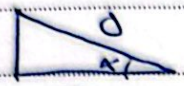
$1+\cos^2x-\sin^2x-1=\cos^2x$

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

Arman

۷- $\sin(\frac{\pi}{2}+\alpha)\cos(\frac{3\pi}{2}+\alpha)+\tan(3\pi-\alpha)$

$=\cos\alpha(-\sin\alpha)+\cot\alpha$



$\sin\alpha=-\frac{۴}{۵}$

$\cos\alpha=-\frac{۳}{۵}$

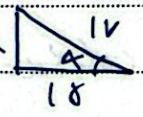
$=\frac{۳}{۵}+\frac{۴}{۵}+\frac{۳}{۴}=۰,۲۷$

۸- $\sin\alpha-\cos\alpha=\sqrt{۲}\sin(\alpha-\frac{\pi}{۴})$

۹- $۲\cos^{۲}x+\sqrt{۲}\sin x-\sqrt{۲}\cos x=۳\cos^{۲}۷۵+\sqrt{۲}(\sin۱۵-\cos۱۵)$

$=۲\cos^{۲}۷۵+\underbrace{\sqrt{۲}\sin(۱۵-۴۵)}_{۲\sin(-۳۰)}=۳\cos^{۲}۷۵-۲\sin۳۰=\frac{۳}{۲}-۱=\frac{۱}{۲}$

$\tan\alpha=\frac{۲\tan\frac{\alpha}{۲}}{۱-\tan^{۲}\frac{\alpha}{۲}}=\frac{۲\times\frac{۱}{۴}}{۱-\frac{۱}{۱۶}}=\frac{۸}{۱۵}$



$\frac{\tan\alpha-\sin\alpha}{\sin\alpha-\cos\alpha}=\frac{\frac{۸}{۱۵}-\frac{۸}{۱۷}}{\frac{۸}{۱۷}-\frac{۱۵}{۱۷}}=\frac{-۱۶}{۱۵۵}$

۱۰- $\frac{\cot\alpha}{\sin\alpha}>۰\Rightarrow\frac{\cos\alpha}{\sin^{۲}\alpha}>۰\Rightarrow\cos\alpha>۰$ ربع اول

$۲\sin\alpha<\sin۲\alpha\longrightarrow ۲\sin\alpha<۲\sin\alpha\cos\alpha$

$\Rightarrow\sin\alpha\cos\alpha-\sin\alpha>۰\longrightarrow\sin\alpha(\underbrace{\cos\alpha-۱}_{-})>۰$

$\Rightarrow\sin\alpha<۰\longrightarrow$ ربع چهارم

$\Rightarrow$ ربع اول و چهارم

Arman