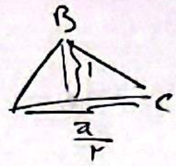
۱-

$y=\tan(-2x+\frac{\pi}{4}) \longrightarrow x=0,\ y=\tan\frac{\pi}{4}=1 \Rightarrow B(0,1)$

$T=\frac{\pi}{|a|}=\frac{\pi}{2} \Rightarrow AC=\frac{\pi}{2}$

14



$S=\frac{\pi}{4}$

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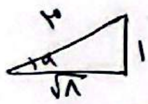
۲-

$y=x^2-(\sin\alpha)x-\frac{1}{4}\underbrace{\cos^2\alpha}_{(1-\sin^2)} \xrightarrow{x=\frac{2}{3}} \frac{4}{9}-\frac{2\sin\alpha}{3}-\frac{1+\sin^2\alpha}{4}=0$

$16-24\sin\alpha-9+9\sin^2\alpha=0 \longrightarrow 9\sin^2\alpha-24\sin+7=0 \Rightarrow \sin\alpha=\frac{24\pm\sqrt{576-252}}{18}$

$\sin\alpha\begin{cases}=\frac{42}{18}\ \times \\ =\frac{6}{18}=\frac{1}{3}\ ✓\end{cases} \Rightarrow 1+\tan^2=\frac{1}{\cos^2}=\frac{1}{\frac{8}{9}}=\frac{9}{8}$

۲

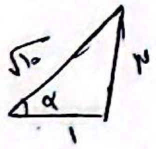


۳-

$\lg\sin\alpha-\lg\cos\alpha=\lg\frac{\sin\alpha}{-\cos\alpha}=\lg -\tan\alpha=3 \longrightarrow \boxed{\tan\alpha=-3}$

چون در $\log_b^a$ ، a باید مثبت باشد ، $-\cos>0$ است

پس $\cos\alpha$ منفی بوده ،



$\Rightarrow \begin{cases}\sin\alpha=\frac{3\sqrt{10}}{10}\\ \cos\alpha=-\frac{\sqrt{10}}{10}\end{cases} \Rightarrow \sin\alpha-\cos\alpha=\frac{4\sqrt{10}}{10}$

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۴-

$\sin^4+\cos^2=\frac{4}{5} \to \sin^4+\underbrace{\cancel{\cos^2+\sin^2}}_{1}-\sin^2=\frac{4}{5} \to \sin^4-\sin^2=-\frac{1}{5} \to \sin^2\underbrace{(\sin^2-1)}_{-\cos^2}=\boxed{-\sin^2\cos^2=-\frac{1}{5}}$

$\cos^4+\sin^2=\cos^4+\underbrace{\cancel{\sin^2+\cos^2}}_{1}-\cos^2=\cos^4-\cos^2+1=\cos^2\underbrace{(\cos^2-1)}_{-\sin^2}+1=-\sin^2\cos^2+1=-\frac{1}{5}+1=\frac{4}{5}$

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۵-

$\frac{3\sin+\sin\cos}{\frac{2+2\cos^2}{\frac{2(1-\cos^2)}{\sin^2}}}=\frac{\sin\overbrace{(3+\cos)}^{\text{همواره مثبت}}}{\underbrace{2\sin^2}_{\text{همواره مثبت}}}<0 \Rightarrow \boxed{\sin\alpha<0}$

$,\ \sin\tan-\frac{1}{\cos}>0 \to \frac{\overbrace{\sin^2-1}^{\text{منفی}}}{\cos}>0 \Rightarrow \boxed{\cos\alpha<0}$

ناحیه ۳

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۶-

$\frac{2}{\sin}+\frac{3}{\cos}=0 \longrightarrow \frac{3\sin+2\cos}{\sin\cos}=0 \longrightarrow 3\sin=-2\cos \Rightarrow \boxed{\tan x=-\frac{2}{3}} \Rightarrow \boxed{\cot x=-\frac{3}{2}}$

$\tan x+\cot x=-\frac{2}{3}-\frac{3}{2}=-\frac{13}{6}$

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۷-

~~[illegible]~~

$\sqrt{1+\sin 10^\circ}=\sqrt{1+\cos 80^\circ} \xrightarrow[1+\cos 80^\circ=2\cos^2 40^\circ]{\text{فرمول طلایی}} \sqrt{2\cos^2 40^\circ}=\sqrt{2}|\cos 40^\circ|=\sqrt{2}\cos 40^\circ$

$\sin 10^\circ+\sin 70^\circ=\sin(40^\circ+30^\circ)+\sin(40^\circ-30^\circ)=$

$\sin 40^\circ\cos 30^\circ+\sin 30^\circ\cancel{\cos 40^\circ}+\sin 40^\circ\cos 30^\circ-\sin 30^\circ\cancel{\cos 40^\circ}=2(\frac{1}{2})\cos 40^\circ=\cos 40^\circ$

$\frac{\sqrt{2}\cos 40^\circ}{\cos 40^\circ}=\boxed{\sqrt{2}}$

طاهر رحیمی

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در $\sin 10$ ضرب می‌کنیم

$$\frac{(1-2\sin^2 10)}{\cos 10}\,\frac{(2\cos^2 10-1)}{\cos 20}\left(\frac{1-\tan^2 20}{1+\tan^2 20}\right)\frac{}{\cos 40} = \cos 10 \times \cos 20 \times \cos 40 \times \sin 10$$

$$= \frac{\sin 10 \cos 10 \times \cos 20 \times \cos 40}{\frac{1}{2}\sin 20 \quad \frac{1}{4}\sin 40 \quad \frac{1}{8}\sin 80} = \frac{1}{8}\sin 80 = \frac{1}{8}\cos 10 \xrightarrow[\text{که در ابتدا ضرب کرده بودیم}]{\text{حال تقسیم}\ \sin 10\ \text{می‌کنیم}} \frac{1}{8}\,\frac{\cos 10}{\sin 10}$$

$$= \frac{1}{8}\cot 10$$

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-۹

$$\sin\alpha + 3\cos\alpha = 2 \rightarrow \sin\alpha = 2-3\cos\alpha$$

$$\rightarrow \cos^2\alpha + (2-3\cos\alpha)^2 = 1 \rightarrow \cos^2\alpha + 4 + 9\cos^2\alpha - 12\cos\alpha = 1$$

$$\rightarrow 10\cos^2\alpha - 12\cos\alpha = -3$$

$$\cos^2\alpha = \frac{1+\cos 2\alpha}{2} \rightarrow \cos 2\alpha = 2\cos^2\alpha - 1 \rightarrow 5\cos 2\alpha = 10\cos^2\alpha - 5$$

$$\rightarrow \underbrace{10\cos^2\alpha - 12\cos\alpha}_{-3} - 5 = -8$$

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کامران علی

15

$$\cos^2\frac{A}{2} = \frac{1+\cos A}{2} \rightarrow 2\sin B\sin C = 1+\cos\hat{A} \xrightarrow{A+B+C=\pi} A = \pi - (\hat{B}+\hat{C})$$

$$1+\cos(\pi-(B+C)) = 1-\cos(B+C) = 2\sin B\sin C$$

$$1-\cos B\cos C + \sin B\sin C = 2\sin B\sin C \rightarrow \sin B\sin C + \cos B\cos C = 1$$

$$\cos(B-C) = 1 \rightarrow \begin{cases} B-C=0 \\ B-C=2\pi \end{cases}$$

مثلث ×

$$\rightarrow B=C \rightarrow A = 180 - 144 = 36$$

$$B+C = 2B \quad (2\times 72)$$