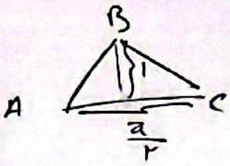
۱-

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

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



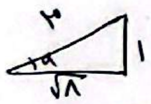
$S = \frac{a}{4}$

۲

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

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

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

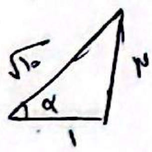


۳-

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

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

پس $\cos\alpha$ منفی بوده ،



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

۴-

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

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

۵-

$\frac{3\sin + \sin\cos}{\cancel{2 - 2\cos^2}} = \frac{\sin(\overset{\text{همواره مثبت}}{3 + \cos})}{\underset{\text{همواره مثبت}}{2\sin^2}} < 0 \Rightarrow \boxed{\sin\alpha < 0}$

$\underset{\sin^2}{2(\cancel{1 - \cos^2})}$

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

ناحیه ۳

۶-

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

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

۷-

~~[illegible]~~

کاظم رحیمی

-۸

در یک $\sin 10$ ضرب می‌کنیم

$$\cancel{\frac{(1-2\sin^2 5)}{\cos 10}}\;\cancel{\frac{(2\cos^2 10-1)}{\cos 20}}\;\underbrace{\cancel{\left(\frac{1-\tan^2 20}{1+\tan^2 20}\right)}}_{\cos 40} = \cos 10 \times \cos 20 \times \cos 40 \times \sin 10$$

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

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

-۹

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

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

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

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

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

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