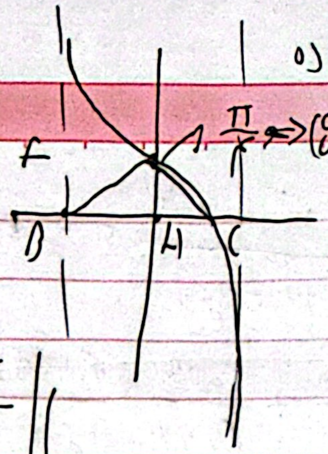
آروین تقی زاده

۱)

$T' = \frac{1}{2}T$

$y = \tan(-2x + \frac{\pi}{4})$



$AH = 1$, $BC = \frac{\pi}{2} \Rightarrow S = \frac{1}{2} \times 1 \times \frac{\pi}{2} = \frac{\pi}{4}$

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۲)

$x^2 - (\sin a)x - \frac{1}{4}\cos^2 a = 0$

$x = \frac{2}{3} \Rightarrow \frac{4}{9} - \frac{2}{3}\sin a - \frac{1}{4}\cos^2 a = 0 \Rightarrow \frac{16 - (24\sin a - 9\cos^2 a)}{36} = 0$

$\Rightarrow 9\sin^2 a + 7 = 0 \Rightarrow (3\sin a - 7)(3\sin a - 1) = 0 \Rightarrow \begin{cases} \sin a = \frac{1}{3} \\ \sin a = \frac{7}{3} \end{cases}$

$\Rightarrow 1 + \tan^2 a = \frac{1}{\cos^2 a}$, $\cos^2 a = 1 - \sin^2 a = 1 - \frac{1}{9} = \frac{8}{9}$

$1 + \tan^2 a = \frac{9}{8}$

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۳)

$\log \frac{-\sin a}{\cos a} = \log 3 \Rightarrow \frac{-\sin a}{\cos a} = 3 \Rightarrow$

$\tan a = -3$ و $\to \log \sin a \Rightarrow \sin a > 0$, $\log -\cos a \quad \cos a < 0$ ۲م

$\frac{1}{\cos^2 a} = 1 + \tan^2 a = 10$

$\Rightarrow \cos a = -\frac{\sqrt{10}}{10} \Rightarrow \sin a = \sqrt{1 - \cos^2 a} = \frac{3\sqrt{10}}{10}$

$\sin a - \cos a = \frac{3\sqrt{10}}{10} - \frac{-\sqrt{10}}{10} = \frac{4\sqrt{10}}{10} = \frac{2\sqrt{10}}{5}$

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۷) ثابت کنید

$$\frac{\sqrt{1+\sin 10^\circ}}{\sin 40^\circ \cdot \cos 10^\circ} = \frac{\sqrt{1+\cos 80^\circ}}{\sin(30^\circ+20^\circ)+\sin(30^\circ-20^\circ)}$$

طرف صورت $= \frac{\sqrt{2\cos^2 40^\circ}}{2\sin 30^\circ \cos 20^\circ} = \frac{\sqrt{2}\cos 40^\circ}{2\times\frac{1}{2}\cos 20^\circ} = \sqrt{2}$ طرف مخرج

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۶) $\sin^4\alpha + 1 - \sin^2\alpha = \frac{4}{5} \Rightarrow \sin^4\alpha - \sin^2\alpha = -\frac{1}{5}$

$\sin^2\alpha(\sin^2\alpha - 1) = -\frac{1}{5} \Rightarrow \sin^2\alpha \cos^2\alpha = \frac{1}{5}$

$(\cos^4\alpha + \sin^4\alpha) + (\sin^2\alpha + \cos^2\alpha) = 1 - 2\sin^2\cos^2\alpha + 1 = 2 - \frac{2}{5} = \frac{8}{5}$

$\cos^2\alpha \cdot \sin^2\alpha = \frac{4}{5}$

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۵) $\frac{2\sin\alpha + \sin\alpha\cos\alpha}{2\sin^2\alpha} = \frac{\sin\alpha(2+\cos\alpha)}{2\sin^2\alpha} = \frac{2+\cos\alpha}{2\sin\alpha} > 0$ (صورت همواره مثبت)

$\Rightarrow \sin\alpha > 0$ (۱)

$\frac{\sin^2\alpha - 1}{\cos\alpha} > 0 \Rightarrow -\frac{\cos^2\alpha}{\cos\alpha} > 0 \Rightarrow \cos\alpha < 0$ (۲)

۱ و ۲ $\rightarrow$ ناحیه سوم

آروین خالق زاده

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8)

$$(1-2\sin^2 5)(2\cos^2 10 - 1)\left(\frac{1-\tan^2 20}{1+\tan^2 20}\right)$$

$$\to \cos 10 \times \cos 20 \times \cos 40 \overset{\times \sin}{=} \frac{\sin 10 \cos 10 \cos 20 \cos 40}{\sin 10}$$

$$= \frac{1}{8}\frac{\sin 80}{\sin 10} = \frac{\cos 10}{8 \sin 10} = \frac{\cot 10}{8}$$

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9) [ایزی و بانمک]

$$\sin a + 3\cos a = 2 \Rightarrow \sin a = 2 - 3\cos a$$

$$\Rightarrow \sin^2 a = 4 - 12\cos a + 9\cos^2 a \Rightarrow 10\cos^2 a - 12\cos a + 4 = 1$$

$$10\cos^2 a - 12\cos a - 5 = -8 \Rightarrow 5\cos 2a - 12\cos a = -8$$

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10)

$$A + B + C = 180 = \pi$$

$$A = \pi - (B+C)$$

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

$$1 - \underbrace{\cos(B+C)}_{\cos B\cos C - \sin B \sin C} = 2\sin B \sin C \Rightarrow \sin B \sin C + \cos B \cos C = 1$$

$$\Rightarrow \cos(B-C) = 1$$ ([illegible]) [illegible]

$B - C = 0$ یا ~~360~~

$$B = C \Rightarrow \Rightarrow A = 36$$

$$B + C + A = 180 \qquad B, C = 72$$

آردین طاهرزاده

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۶)

$$\frac{2\cos\theta + 3\sin\theta}{5\sin\theta\cos\theta} = 0 \Rightarrow 2\cos\theta = -3\sin\theta$$

$$\tan\theta + \cot\theta = \frac{\sin\theta}{\cos\theta} + \frac{\cos\theta}{\sin\theta} = \frac{\sin^2\theta + \cos^2\theta}{\sin\theta\cos\theta} = \frac{1}{\sin\theta\cos\theta} = \frac{1}{-\frac{3}{2}\sin^2\theta}$$

$$3\sin\theta = -2\cos\theta \Rightarrow 9\sin^2\theta = 4\cos^2\theta \Rightarrow 9\sin^2\theta = 4 - 4\sin^2\theta$$

$$\Rightarrow \sin^2\theta = \frac{4}{13} \Rightarrow \frac{1}{-\frac{3}{2}\sin^2\theta} = \frac{1}{-\frac{3}{2} \times \frac{4}{13}} = \frac{1}{-\frac{6}{13}} = -\frac{13}{6}$$