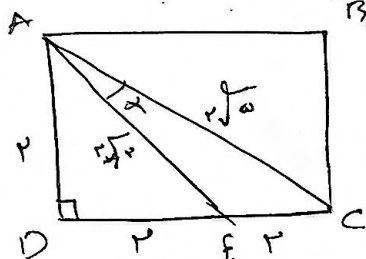


$$\rightarrow S_{\triangle ABC} = \frac{1}{2} AB \cdot AC \sin \alpha \rightarrow S_{\triangle ABC} = \frac{1}{2} \times \sqrt{2} \times 2 \times \sin \alpha$$

$$\rightarrow S_{\triangle ABC} = \frac{\sqrt{2}}{2} \rightarrow \alpha = \frac{\pi}{4} = \frac{\sqrt{2}}{2}$$

$$\rightarrow \frac{\frac{\sqrt{2}}{2}}{\frac{\sqrt{2}}{2}} = \boxed{1}$$

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$$B \quad AE = \sqrt{2+2} = 2\sqrt{2}, \quad AC = \sqrt{2+4} = 2\sqrt{3}$$

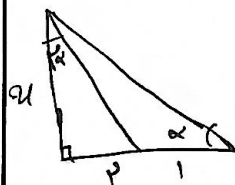
$$\text{بقانون کوسین: } c^2 = (a+b)^2 - 2ab \cos \alpha$$

$$\rightarrow 4 = 2\sqrt{2} - 2\sqrt{2} \cdot 2\sqrt{3} \cos \alpha \rightarrow \cos \alpha = \frac{2\sqrt{2}}{2\sqrt{2} \cdot 2\sqrt{3}} = \frac{1}{2\sqrt{3}}$$

$$\Rightarrow \cos \alpha = \frac{1}{2}$$



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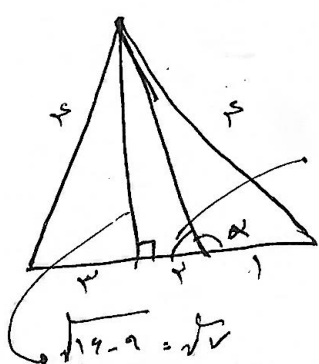
$$\rightarrow \tan \alpha = \frac{a}{1}, \quad \tan 2\alpha = \frac{2}{a}$$

$$\rightarrow \tan 2\alpha = \frac{2 \tan \alpha}{1 - \tan^2 \alpha} = \frac{\frac{2a}{1}}{1 - \frac{a^2}{1}} = \frac{\frac{2a}{1}}{\frac{1-a^2}{1}} = \frac{2a}{1-a^2}$$

$$\rightarrow \frac{2a}{1-a^2} = \frac{2}{a} \Rightarrow 2a^2 = 1 - a^2 \rightarrow 3a^2 = 1 \rightarrow a = \frac{1}{\sqrt{3}} \quad (\tan \alpha)$$

$$\rightarrow \tan \alpha = \frac{1}{\sqrt{3}}, \quad \cos \alpha = \frac{\sqrt{3}}{2}$$

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

$$\Rightarrow \tan \alpha = \frac{-\sqrt{2}}{2}$$

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$$2 \sin^2 \alpha + \cos^2 \alpha = \sin^2 \alpha + \underbrace{\sin^2 \alpha + \cos^2 \alpha}_{=1} = \frac{5}{4} \rightarrow \sin^2 \alpha = \frac{1}{4}$$

$$\cos^2 \alpha = \frac{1}{\sin^2 \alpha} - 1 = 4 - 1 = 3 \Rightarrow \tan^2 \alpha = \frac{1}{3}$$

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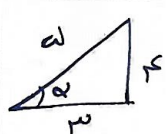
$$(\sin^2 - \cos^2)(\sin^2 + \cos^2) = (\sin^2 - \cos^2)$$

مخرج مشترك :  $\frac{\sin^2 \epsilon - \cos^2 \epsilon + \sin^2 \epsilon - \cos^2 \epsilon + \gamma \cos^2 \epsilon - \gamma \sin^2 \epsilon + \gamma \cos^2 \epsilon \sin^2 \epsilon - \gamma \cos^2 \epsilon \sin^2 \epsilon}{1 + \sin^2 \epsilon + \cos^2 \epsilon + \cos^2 \epsilon \sin^2 \epsilon}$

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

$$= \frac{(\sin^2 - \cos^2)^2 + \gamma(\cos^2 - \sin^2) + (\sin^2 - \cos^2)(\sin^2 + \cos^2 + \sin^2 \cos^2)}{\gamma + \sin^2 \cos^2} = \frac{-(\sin^2 - \cos^2)(\gamma + \sin^2 \cos^2)}{\gamma + \sin^2 \cos^2}$$

$$= \cos^2 - \sin^2 = \cos^2 \gamma \alpha$$



$$\sin \alpha = \frac{\alpha}{\sqrt{\gamma^2 + \alpha^2}} \quad \text{tg } \alpha = \frac{\alpha}{\gamma}$$

$$\cos \alpha = \frac{\gamma}{\sqrt{\gamma^2 + \alpha^2}} \quad \cot \alpha = \frac{\gamma}{\alpha}$$

$$\rightarrow \sin\left(\frac{\alpha}{\gamma} + \alpha\right) \cos\left(\frac{\alpha}{\gamma} - \alpha\right) - \text{tg}\left(\alpha - \frac{\alpha}{\gamma}\right) = (\cos \alpha)(-\sin \alpha) + \cot \alpha$$

$$= -\cos \alpha \sin \alpha + \cot \alpha = -\left(-\frac{\alpha}{\alpha}\right)\left(-\frac{\alpha}{\alpha}\right) + \frac{\gamma}{\alpha} = \frac{-\alpha}{\alpha} + \frac{\gamma}{\alpha} = \frac{\gamma - \alpha}{\alpha}$$

$$\gamma \cos \frac{\alpha}{\gamma}, \quad \gamma \cos \frac{\alpha}{\gamma} = \gamma \cos \frac{\alpha}{\gamma} = \frac{\gamma}{\gamma}$$

$$\sqrt{\gamma} \sin \alpha - \sqrt{\gamma} \cos \alpha = \sqrt{\gamma} (\sin \alpha - \cos \alpha), \quad \sqrt{\gamma} \left(\sqrt{\gamma} \sin\left(\alpha - \frac{\alpha}{\gamma}\right)\right)$$

$$= \gamma \sin\left(-\frac{\alpha}{\gamma}\right) = -\gamma \sin \frac{\alpha}{\gamma} = -1$$

$$\rightarrow (\gamma \cos \frac{\alpha}{\gamma} + \sqrt{\gamma} \sin \alpha - \sqrt{\gamma} \cos \alpha) = \frac{\gamma}{\gamma} - 1 = \frac{1}{\gamma}$$

$$\text{tg}^2\left(\frac{\alpha}{\gamma}\right) = \frac{1 - \cos \frac{2\alpha}{\gamma}}{1 + \cos \frac{2\alpha}{\gamma}} = \frac{1}{14} \rightarrow 14 - 14 \cos \frac{2\alpha}{\gamma} = 1 + \cos \frac{2\alpha}{\gamma} \rightarrow 14 = 15 \cos \frac{2\alpha}{\gamma}$$

$$\Rightarrow \cos \alpha = \frac{14}{15} \rightarrow \cos \alpha > 0, \text{ tg } \frac{\alpha}{\gamma} > 0 \Rightarrow \alpha \text{ حاد}$$



$$\frac{\text{tg } \alpha - \sin \alpha}{\sin \alpha - \cos \alpha} = \frac{\frac{1}{10} - \frac{1}{17}}{\frac{1}{17} - \frac{10}{17}} = \frac{\frac{14}{170}}{\frac{-9}{17}} = \frac{14 \times 17}{-9 \times 170} = \frac{14 \times 17}{-9 \times 10} = \frac{-14}{10}$$

$$\gamma \sin \alpha < \sin \gamma \alpha \rightarrow \gamma \sin \alpha < \gamma \sin \alpha \cos \alpha \rightarrow \sin \alpha < \sin \alpha \cos \alpha$$

$$\rightarrow 0 < \sin \alpha \cos \alpha - \sin \alpha \rightarrow 0 < \sin \alpha (\cos \alpha - 1) \rightarrow \sin \alpha < 0$$

$$0 < \frac{\cos \alpha}{\sin \alpha} \xrightarrow{\sin \alpha < 0} \cos \alpha < 0 \Rightarrow \alpha \text{ حاد}$$