هلیا غفاری

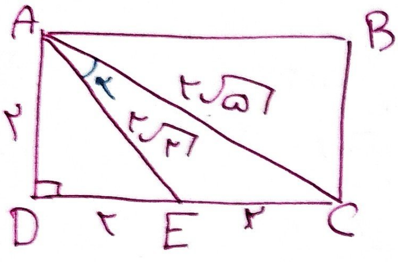
①

$$S_{\Delta}=\frac{۱}{۲}ab\sin\alpha \rightarrow \frac{۹}{۲}=۶\times\sqrt{۳}\times\frac{۱}{۲}\times\sin\alpha$$

$$\Rightarrow \sin\alpha=\frac{\overset{۳}{\cancel{۹}}}{۲}\times\frac{۱}{\cancel{۹}}\times\frac{۱}{\sqrt{۳}}\times\cancel{۲}=\frac{۳}{۲\sqrt{۳}}=\frac{۳\sqrt{۳}}{۶}=\frac{\sqrt{۳}}{۲}\begin{cases}\rightarrow\alpha=۶۰\\ \alpha=۱۲۰\end{cases}$$

$$\frac{\alpha_{max}}{\alpha_{min}}=\frac{۱۲۰}{۶۰}=\overset{\cancel{۳}}{\boxed{۲}}$$

②

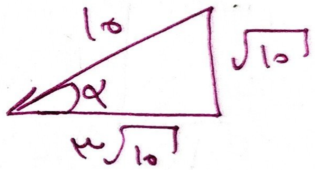


$$S_{AEC}=S_{ACD}-S_{ADE}$$

$$\left.\begin{array}{l}S_{ACD}=\frac{۱}{۲}\times۴\times۲=۴\\ S_{ADE}=\frac{۱}{۲}\times۲\times۲=۲\end{array}\right\}S_{AEC}=۲$$

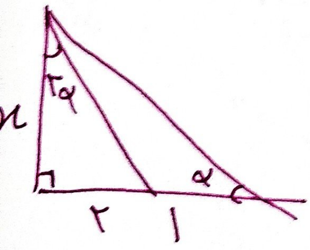
$$S_{AEC}=\frac{۱}{۲}\times AC\times AE\times\sin\alpha \xrightarrow[\text{ط. فیثاغورث}]{AE \text{ و } AC} ۲=۲\sqrt{۲}\times۲\sqrt{۵}\times\frac{۱}{۲}\times\sin\alpha$$

$$\sin\alpha=\cancel{۲}\times\frac{۱}{\cancel{۲}\sqrt{۲}}\times\frac{۱}{\cancel{۲}\sqrt{۵}}\times\cancel{۲}=\frac{۱}{\sqrt{۱۰}}=\frac{\sqrt{۱۰}}{۱۰}$$



$$=\cos\alpha=\frac{۳\sqrt{۱۰}}{۱۰}\Rightarrow\cot\alpha=\frac{۳\cancel{\sqrt{۱۰}}}{\cancel{\sqrt{۱۰}}}=\boxed{۳}$$

③

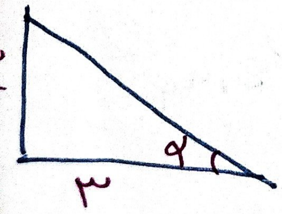


$$\tan\alpha=\frac{x}{۳} \text{ و } \tan۲\alpha=\frac{۲}{x}$$

$$\tan۲\alpha=\frac{۲\tan\alpha}{۱-\tan^{۲}\alpha}\Rightarrow\frac{۲}{x}=\frac{\frac{۲x}{۳}}{۱-\frac{x^{۲}}{۹}}$$

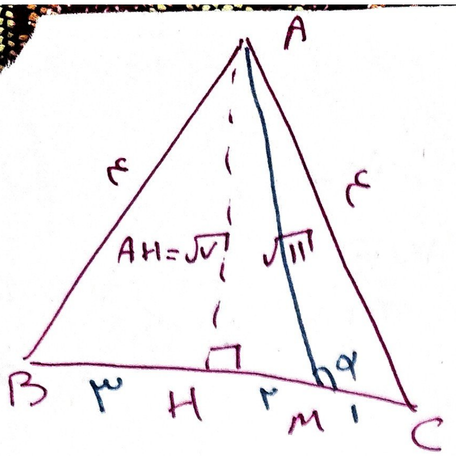
$$\Rightarrow\frac{\frac{۲x}{\cancel{۳}}}{\frac{۹-x^{۲}}{\cancel{۹}۳}}=\frac{۲}{x}\Rightarrow\frac{۶x}{۹-x^{۲}}$$

$$\Rightarrow ۱۸-۲x^{۲}=۶x^{۲}\rightarrow۱۸=۸x^{۲}\rightarrow۹=۴x^{۲}\rightarrow x^{۲}=\frac{۹}{۴}\xrightarrow[\text{ضلع مثبت است}]{\text{طول}}\boxed{x=\frac{۳}{۲}}$$



$$\Rightarrow\cot\alpha=\frac{\frac{\cancel{۳}}{۱}}{\frac{\cancel{۳}}{۲}}=\boxed{۲}$$

۸



$S_{AMC} = S_{AHC} - S_{AHM}$

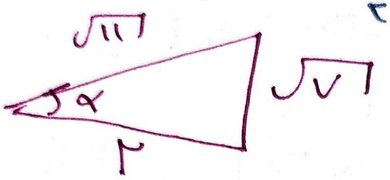
$S_{AM\cancel{C}H} = \frac{۱}{۲} \times \sqrt{۷} \times ۲ = \sqrt{۷}$

$S_{AHC} = \frac{۱}{۲} \times \sqrt{۷} \times ۳ = \frac{۳\sqrt{۷}}{۲}$

$S_{AMC} = \frac{۳\sqrt{۷}}{۲} \quad \frac{۲\sqrt{۷}}{۲} = \frac{\sqrt{۷}}{۲}$

$\Rightarrow \frac{۱}{۲} \times \sqrt{۱۱} \times ۱ \times \sin\alpha = \frac{\sqrt{۷}}{۲} \rightarrow \sin\alpha = \frac{\sqrt{۷}}{\cancel{۲}} \cancel{\times ۲} \times \frac{۱}{\sqrt{۱۱}}$

$= \frac{\sqrt{۷}}{\sqrt{۱۱}}$

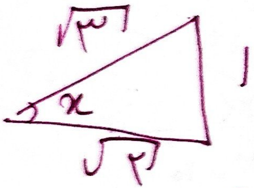


$\Rightarrow \tan\alpha = \boxed{\frac{\sqrt{۷}}{۲}}$

* * *

۹

$\sin^۲ x + \underbrace{\sin^۲ x + \cos^۲ x}_{۱} = \frac{۴}{۳} \Rightarrow \sin^۲ x = \frac{۱}{۳}^{+} \rightarrow \sin x = \frac{۱}{\sqrt{۳}}$



$= \tan x = \frac{۱}{\sqrt{۲}} \rightarrow \tan^۲ x = \boxed{\frac{۱}{۲}}$

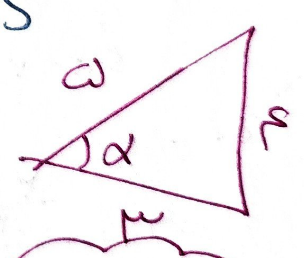
* * *

۷

$-\cos\alpha \cdot \sin\alpha + \tan = \frac{-\cos^۲ \cdot \sin - \sin}{\cos}$

$= \frac{-\sin(+\cos^۲ + ۱)}{\cos}$

$\cos^۲ = \frac{۹}{۲۵} + ۱$



$= \frac{-\frac{۴}{\cancel{۵}}\left(\frac{۳۴}{۲۵}\right)}{\frac{۳}{\cancel{۵}}} = \frac{-۴ \times ۳۴}{۲۵ \times ۳} = \boxed{-\frac{۱۳۶}{۷۵}}$

* * *

۱۰

$۲\sin\alpha < \sin ۲\alpha \Rightarrow \cancel{۲\sin\alpha}\cos\alpha > \cancel{۲\sin\alpha}$

$\Rightarrow \cos\alpha > ۱$

ع ممکن