تکلیف ۲۷ — احمد مارانی — ۲۰

.1

$$S = \sqrt{3} \times 6 \times \frac{1}{2} \times \sin\alpha = 4{,}5$$

$$\hookrightarrow \sin\alpha = \frac{4{,}5}{3\sqrt{3}} = \frac{1{,}5}{\sqrt{3}} = \frac{\sqrt{3}}{2}$$

$$0 < \alpha < 180 \rightarrow \alpha_{min} = 60 \quad \text{و} \quad \alpha_{max} = 120$$

$$\hookrightarrow \frac{\pi}{6} \qquad \hookrightarrow \frac{2\pi}{3}$$

$$\Rightarrow \frac{\frac{2\pi}{3}}{\frac{\pi}{3}} = \frac{120}{60} = 2$$ برابر

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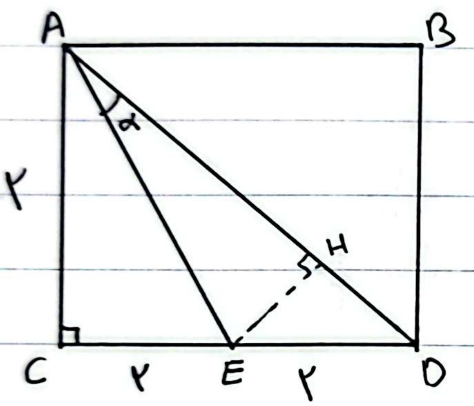
.2



$$AC^2 = DC^2 + AD^2 = 16 + 4 = 20$$

$$AC = \sqrt{20}$$

$$S_{\overset{\Delta}{ADE}} = S_{\overset{\Delta}{ACD}} - S_{\overset{\Delta}{ACE}}$$

$$\hookrightarrow 4 - 2 = 2$$

$$S_{ADE} = \frac{HE \times AD}{2} = 2 \rightarrow HE \times \underset{\sqrt{20}}{AC} = 4 \rightarrow HE = \frac{4}{2\sqrt{5}}$$

$$HE = \frac{2}{\sqrt{5}} = 0{,}4\sqrt{5} \qquad AH^2 + HE^2 = AE \rightarrow AH^2 + 0{,}8 = 8 \rightarrow AH = 6\sqrt{0{,}2}$$

$$\cot\alpha = \frac{AH}{HE} = \frac{6\sqrt{0{,}2}}{0{,}4\sqrt{5}} = \sqrt{\frac{7{,}2}{0{,}8}} = \sqrt{9} = \boxed{3}$$

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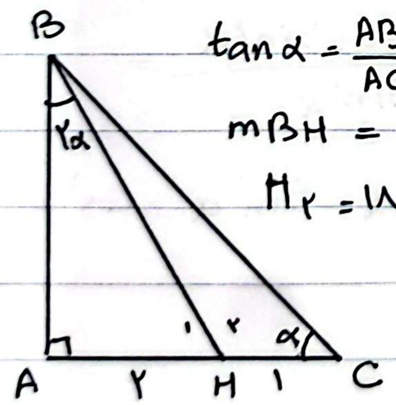
.3



$$\tan\alpha = \frac{AB}{AC} = \frac{AB}{3} \rightarrow AB = 3\tan\alpha$$

$$m_{BH} = \tan H_2 \Rightarrow \frac{AB}{AG} = \frac{3\tan\alpha}{2}$$

$$H_2 = 180 - H_1 \rightarrow H_2 = 180 - 180 + 90 + 2\alpha$$

$$= 90 - 2\alpha$$

$$\tan H_2 = \tan(90 - 2\alpha) = \cot 2\alpha$$

$$\hookrightarrow \cot 2\alpha = \frac{\cot^2\alpha - 1}{2\cot\alpha} \rightarrow \frac{3\tan\alpha}{2} = \frac{\cot^2\alpha - 1}{2\cot\alpha}$$

$$\hookrightarrow \cot\alpha = \boxed{2}$$

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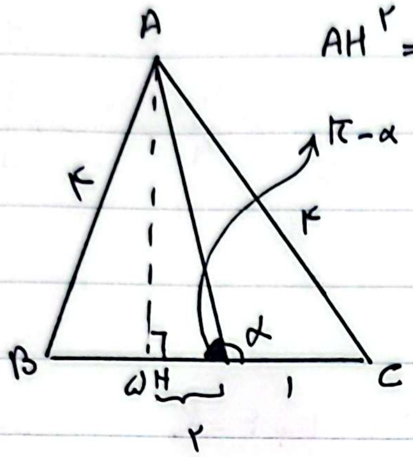
تکلیف ۲۷ — الهه مارانی

.4



$AH^2 = 16 - 9 = 7 \rightarrow AH = \sqrt{7}$

$\tan(\pi-\alpha) = \frac{\sqrt{7}}{2} \rightarrow \tan(\alpha) = -\frac{\sqrt{7}}{2}$

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.5

$\sin^2x + \sin^2x + \cos^2x = \frac{4}{3} \rightarrow \sin^2x = \frac{1}{3}$

$\cot^2 + 1 = \frac{1}{\sin^2} \rightarrow \cot^2 = 2 \rightarrow \tan^2 = \frac{1}{2}$

.6

$\frac{\sin^4\alpha + 4\cos^2\alpha}{1+\cos^2\alpha} - \frac{\cos^4\alpha + 4\sin^2\alpha}{1+\sin^2\alpha}$

$(\cos^2\alpha)^2 = (1-\sin^2\alpha)$ $\quad (\sin^2\alpha)^2 = (1-\cos^2\alpha)^2 = 1+\cos^4\alpha - 2\cos^2\alpha$

$1+\sin^4\alpha - 2\sin^2\alpha$

$\frac{1+\cos^4\alpha - 2\cos^2\alpha + 4\cos^2\alpha}{1+\cos^2\alpha} - \frac{1+2\sin^2\alpha + \sin^4\alpha}{1+\sin^2\alpha} =$

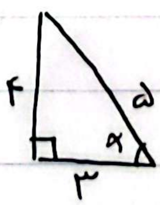
$\rightarrow 1+\cos^2\alpha - (1+\sin^2\alpha) = \cos^2\alpha - \sin^2\alpha = \cos 2\alpha$

.7

$\cos(\frac{7\pi}{2} - \alpha) = -\sin\alpha$

$-\tan(\alpha - \frac{3\pi}{2}) = \cot\alpha \Rightarrow (-\frac{3}{5}) \times (\frac{4}{5}) + \frac{3}{4} = 0.27$

$\sin(\frac{9\pi}{2} + \alpha) = \cos\alpha$



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$$\left(3\cos\frac{\pi}{3} + \underline{\sqrt{2}\sin x - \sqrt{2}\cos x}\right)$$

$$3\cos\frac{\pi}{3} \Rightarrow \frac{1}{2}$$

$$\sqrt{2}\sin x - \sqrt{2}\cos x \Rightarrow \sqrt{2}(\sin x - \cos x)$$

$$\sqrt{2}\sin\left(x - \frac{\pi}{4}\right) \Rightarrow -\frac{\pi}{4}$$

$$\left.\right\} \frac{3}{2} - 1 = \frac{1}{2}$$

.9

$$\tan\left(\frac{\alpha}{2}\right) = \frac{1}{4}$$

$$\hookrightarrow \tan\alpha = \frac{2\tan\left(\frac{\alpha}{2}\right)}{1-\tan^2\left(\frac{\alpha}{2}\right)} = \frac{2\times\frac{1}{4}}{1-\left(\frac{1}{4}\right)^2} = \frac{16}{30} = \frac{8}{15}$$

$$1+\tan^2 = \frac{1}{\cos^2} \rightarrow 1+\frac{64}{225} = \frac{289}{225} \rightarrow \cos = \frac{15}{17}$$

$$1+\cot^2 = \frac{1}{\sin^2} \rightarrow 1+\frac{225}{64} = \frac{289}{64} \rightarrow \sin = \frac{8}{17}$$

$$\frac{\tan\alpha - \sin\alpha}{\sin\alpha - \cos\alpha} = \frac{\frac{8}{15} - \frac{8}{17}}{\frac{8}{17} - \frac{15}{17}} = -\frac{272}{1785} \xrightarrow{\text{تقریبا}} \text{۰/۱۵}$$

.10

$$\frac{\cot\alpha}{\sin\alpha} > 0 \rightarrow \frac{\cos/\sin}{\sin} \Rightarrow \frac{\cos}{\sin^2} > 0 \rightarrow \cos > 0$$

$$2\sin < \sin 2\alpha \rightarrow 2\sin 45 < \sin 90 \rightarrow \sqrt{2} < 1$$

ربع چهارم

الهه مالکی ۱۱ تکالیف

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