SUBJECT

Year: Month: Day:

ریاضی ۱۹,۵

Page : ( )

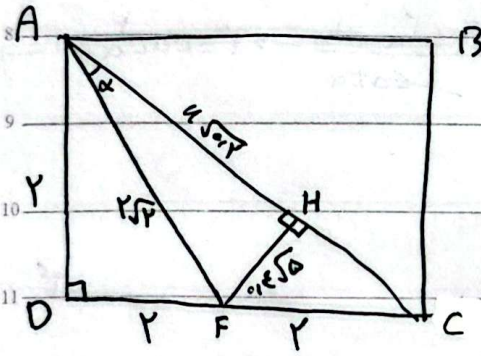
۱-

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

$0 < \alpha < 180$ شیب $\longrightarrow \alpha_{min} = 60^\circ = \frac{\pi}{3}$ ، $\alpha_{max} = 120^\circ = \frac{2\pi}{3}$ (۵)

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

۲-



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

$AC = \sqrt{20}$ (۵)

$S_{ACF}^{\triangle} = S_{ACD}^{\triangle} - S_{ADF}^{\triangle}$

$S_{ACF}^{\triangle} = \frac{2 \times 4}{2} - \frac{2 \times 2}{2} = 4 - 2 = 2$

$S_{ACF} = \frac{HF \times AC}{2} = 2 \rightarrow HF \times \frac{AC}{\sqrt{20}} = 4 \longrightarrow HF = \frac{4}{2\sqrt{5}}$

$HF = \frac{2}{\sqrt{5}} = \frac{2\sqrt{5}}{5} = 0,4\sqrt{5}$

$AH^2 + HF^2 = AF^2 \longrightarrow AH^2 + \frac{16 \times 4}{100} = 8 \longrightarrow AH^2 = 8 - 0,8 = 7,2 \longrightarrow$

$AH = \sqrt{7,2} = 4\sqrt{0,2}$

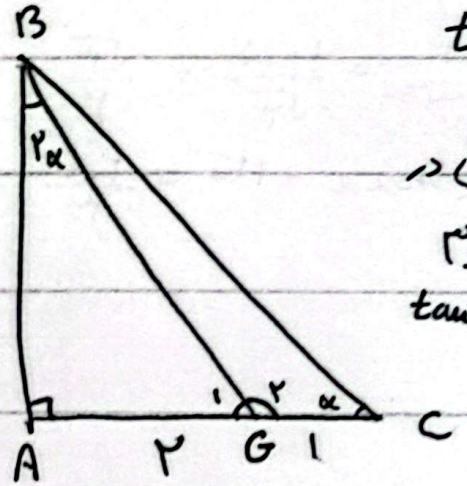
$\cot\alpha = \frac{AH}{HF} = \frac{4\sqrt{0,2}}{0,4\sqrt{5}} = \frac{\sqrt{7,2}}{\sqrt{0,8}} = \sqrt{\frac{7,2}{0,8}} = \sqrt{9} = 3$

SUBJECT :

Year: Month: Day:

پدرپا امینی

۳-



$\tan\alpha = \frac{AB}{AC} = \frac{AB}{۳} \rightarrow AB = ۳\tan\alpha$

اگر BG را خطی در نظر گیریم و حول محقیات در نظر گیریم شیب آن برابر $\tan G_۲$ است

$m_{BG} = \tan G_۲ \rightarrow m_{BG} = \frac{AB}{AG} = \frac{۳\tan\alpha}{۲}$

$G_۲ = ۱۸۰ - G_۱ \xrightarrow{G_۱ = ۱۸۰ - ۹۰ - ۲\alpha} G_۲ = ۱۸۰ - ۱۸۰ + ۹۰ + ۲\alpha$

$G_۲ = ۹۰ - ۲\alpha$

$\tan G_۲ = \frac{۳\tan\alpha}{۲} = \tan(۹۰ - ۲\alpha) = \cot ۲\alpha$

$\cot ۲\alpha = \frac{\cot^۲\alpha - ۱}{۲\cot\alpha} \rightarrow \frac{۳\tan\alpha}{۲} = \frac{\cot^۲\alpha - ۱}{۲\cot\alpha} \rightarrow ۳ = \cot^۲\alpha - ۱ \rightarrow$

$\frac{۳}{۲\cot\alpha}$

$\cot^۲\alpha = ۴ \rightarrow \cot\alpha = ۲$

SUBJECT

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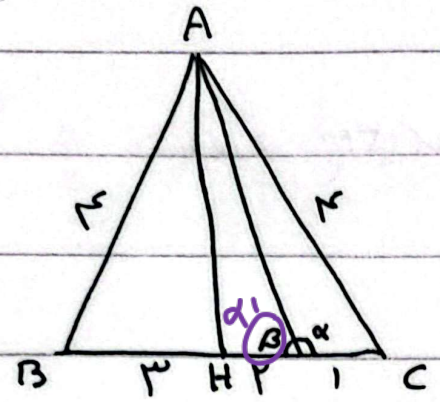
$AC^2 = CH^2 + AH^2 \rightarrow AH = \sqrt{7}$ $\quad \tan\alpha' = \frac{AH}{HD} = \frac{\sqrt{7}}{2}$

$\tan\alpha' = -\tan\alpha = -\frac{\sqrt{7}}{2}$ مکمل یا اصلی



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$\beta = 180 - \alpha$

$\tan\beta = \tan(180 - \alpha) = -\tan\alpha$

$\tan\beta = \frac{AH}{2} = \frac{\sqrt{3}}{2}$

$-\tan\alpha = \frac{\sqrt{3}}{2}$

$\tan\alpha = -\frac{\sqrt{3}}{2}$

1,0

$AH^2 + BH^2 = AB^2 \rightarrow AH^2 + 9 = 16 \rightarrow AH^2 = 7 \rightarrow AH = \sqrt{7}$

$16 - 9 = 7$

۵-

$2\sin^2\alpha + \cos^2\alpha = \frac{5}{3} \rightarrow \sin^2\alpha + \underbrace{\sin^2\alpha + \cos^2\alpha}_{1} = \frac{5}{3} \rightarrow$

۱

$\sin^2\alpha = \frac{5}{3} - 1 = \frac{1}{3}$

$1 + \cot^2\alpha = \frac{1}{\sin^2\alpha} \rightarrow 1 + \cot^2\alpha = \frac{1}{\frac{1}{3}} = 3 \rightarrow \cot^2\alpha = 2 \rightarrow$

$\tan^2\alpha = \frac{1}{2}$

۴- مثلثاتی

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

$\sin^2\alpha = s$ $\quad \cos^2\alpha = c$

$$\frac{s^2+4(1-s)}{1+(1-s)} - \frac{(1-s)^2+4s}{1+s}$$ (۵)

$$\frac{s^2+4-4s}{2-s} = \frac{s^2-4s+4}{2-s} = \frac{(s-2)^2}{2-s} = \frac{(2-s)^2}{2-s} = 2-s$$

$$\frac{(1-s)^2+4s}{1+s} = \frac{1-2s+s^2+4s}{1+s} = \frac{s^2+2s+1}{1+s} = \frac{(s+1)^2}{s+1} = s+1$$

کل عبارت: $(2-s)-(s+1) = 2-s-s-1 = 1-2s$

$= 1-2\sin^2\alpha = \cos 2\alpha$

دریا السینی

۷.

$\sin\left(\frac{9\pi}{2}+\alpha\right)\cos\left(\frac{7\pi}{2}-\alpha\right)+\tan\left(\frac{3\pi}{2}-\alpha\right)$

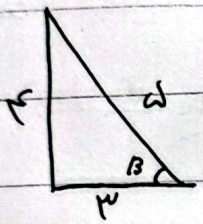
$\frac{\pi}{2}+\alpha$ ، $\frac{3\pi}{2}-\alpha$ (۳)

$(\cos\alpha)(-\sin\alpha)+\cot\alpha$

$\cos(180+\omega\pi)(-\sin(180+\omega\pi)+\frac{\pi}{4}=\underbrace{-\cos\omega\pi}_{-\frac{3}{5}}\times\underbrace{\sin\omega\pi}_{\frac{4}{5}}+\frac{\pi}{4}=\frac{-12}{20}+\frac{3}{4}=$

$\tan\alpha=\frac{4}{3}$

$\frac{-48+75}{100}=0/27$



$\tan\beta=\frac{4}{3}\rightarrow\beta=53^\circ$ ← α در ربع سوم است

$\tan\beta=\tan\alpha$ ؛

$\alpha=233\leftarrow\beta+180=\alpha$

۸.

$(3\underbrace{\cos\frac{\pi}{3}}_{\frac{1}{2}}+\underbrace{\sqrt{2}\sin\alpha-\sqrt{2}\cos\alpha}_{\sqrt{2}(\sin\alpha-\cos\alpha)})=\frac{3}{2}+\underbrace{2\sin\left(-\frac{\pi}{9}\right)}_{-2\sin\frac{\pi}{9}}=$

$\sqrt{2}\sin\left(\pi-\frac{\pi}{4}\right)$ (۹)

$\frac{\pi}{12}-\frac{3\pi}{12}=\frac{-2\pi}{12}=-\frac{\pi}{9}$

$\frac{3}{2}-1=\frac{1}{2}$

پرسش ۹

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

$$t = \tan\frac{\alpha}{2} = \frac{1}{4} \qquad \tan\alpha = \frac{2t}{1-t^2} = \frac{2(\frac{1}{4})}{1-(\frac{1}{4})^2} = \frac{\frac{1}{2}}{1-\frac{1}{16}} = \frac{\frac{1}{2}}{\frac{15}{16}} = \frac{8}{15}$$

$$\sin\alpha = \frac{2t}{1+t^2} = \frac{\frac{1}{2}}{1+\frac{1}{16}} = \frac{\frac{1}{2}}{\frac{17}{16}} = \frac{8}{17}$$

$$\cos\alpha = \frac{1-t^2}{1+t^2} = \frac{1-\frac{1}{16}}{1+\frac{1}{16}} = \frac{\frac{15}{16}}{\frac{17}{16}} = \frac{15}{17}$$

$$\frac{\tan\alpha-\sin\alpha}{\sin\alpha-\cos\alpha} = \frac{\frac{8}{15}-\frac{8}{17}}{\frac{8}{17}-\frac{15}{17}} = \frac{\frac{16}{255}}{-\frac{7}{17}} = -\frac{272}{1785} \Rightarrow$$

$$\simeq -0.1523$$

دریا امینی

۱۰-

$2\sin\alpha < \sin 2\alpha \rightarrow 2\sin\alpha < 2\sin\alpha\cos\alpha$

$\Rightarrow \sin\alpha(\underbrace{1-\cos\alpha}_{\text{همواره بزرگتر مساوی } 0}) < 0 \rightarrow \sin < 0$

مساوی نمی تواند باشد
چون نابرابری برقرار است

(۶)

$\frac{\cot\alpha}{\sin\alpha} > 0 \rightarrow \cot\alpha < 0$

در حالی که $\sin\alpha > 0$ (یعنی ربع ۳ و ۴)

تنها در ربع ۴ $\cot\alpha > 0$ می باشد

پس α انتهای کمانش در ربع ۴ است.