سید سعید میر محمد الباقی یازدهم ۸

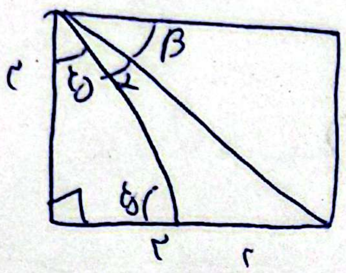
۱

$S=\frac{1}{2}ab\sin\alpha$ $\quad 40{,}5=\frac{1}{2}\times 6\times 9\sqrt{3}\times\sin\alpha$ $\quad \sin\alpha=\frac{\sqrt{3}}{2}$

$\sin(120^\circ)=\frac{\sqrt{3}}{2}$ $\qquad \frac{120}{60}=2$

$\sin(60^\circ)=\frac{\sqrt{3}}{2}$

۲



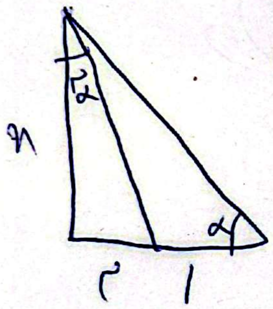
$\alpha+\beta=45$

$\tan(\alpha+\beta)=\frac{\tan\alpha+\tan\beta}{1-\tan\alpha\tan\beta}$

$1-\frac{\tan\alpha}{2}=\tan\alpha+\frac{1}{2} \Rightarrow \tan\alpha=\frac{1}{3}$

$\Rightarrow \cot\alpha=3$

۳



$\tan2\alpha=\frac{2}{x}$

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

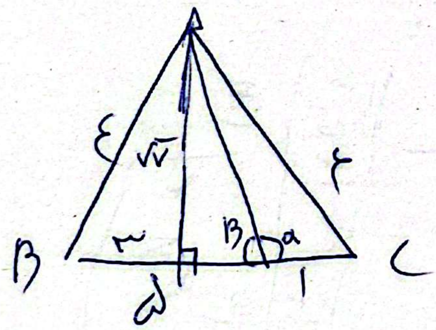
$\tan2\alpha=\frac{2\tan\alpha}{1-\tan^2\alpha}$

$\frac{2}{x}=\frac{\frac{2x}{3}}{1-\frac{x^2}{9}}$, $\quad \frac{18-2x^2}{9}=\frac{2x^2}{3}$

$\rightarrow x^2=\frac{9}{4} \Rightarrow x=\frac{3}{2}$

$\Rightarrow \cot2\alpha=\frac{\frac{3}{2}}{2}=$ ④

۴



$\alpha+\beta=\pi$ $\qquad \tan(\pi-\alpha)=-\tan\alpha=\tan\beta$

$\tan\beta=\frac{\sqrt{7}}{2} \Rightarrow \tan\alpha=-\frac{\sqrt{7}}{2}$

۵

$1+\sin^2x=\frac{3}{2}$ $\qquad \sin^2x=\frac{1}{2}$

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

۶

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

$\frac{\cos^4\alpha+2\cos^2\alpha+1}{1+\cos^2\alpha}-\frac{\sin^4\alpha+2\sin^2\alpha+1}{1+\sin^2\alpha}=\cos^2\alpha-\sin^2\alpha=\cos2\alpha$

7

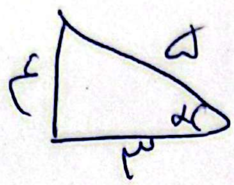
$\sin(\frac{\pi}{2}+\alpha)\cos(\frac{3\pi}{2}-\alpha)+\cot\alpha$

$\cos\alpha \qquad -\sin\alpha$

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

$\frac{3}{5}\times-\frac{4}{5}+\frac{3}{4}=\frac{27}{100}$

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



$\Rightarrow\cos\alpha=\frac{3}{5}$

8

$\sin^2\alpha=\frac{1-\cos2\alpha}{2}$

$\sqrt{\frac{2-\sqrt{3}}{4}}=\sin\frac{\pi}{12} \qquad \sqrt{\frac{2+\sqrt{3}}{4}}=\cos\frac{\pi}{12}$

$2\cos\frac{\pi}{3}+\sqrt{2}(\sin\frac{\pi}{12}-\cos\frac{\pi}{12})=$

$(\sin x-\cos x)^2=1-2\sin x\cos x=1-\frac{1}{2}=\sqrt{\frac{1}{2}}=|\sin x-\cos x|$

$\sin x-\cos x=-\frac{\sqrt{2}}{2}$

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

9

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

کسر را بر cos تقسیم کنیم $\Rightarrow$ $\frac{\frac{\tan\alpha}{\cos\alpha}-\tan\alpha}{\tan\alpha-1}=\frac{\frac{\frac{8}{15}}{\frac{15}{17}}-\frac{8}{15}}{\frac{8}{15}-1}=\frac{-16}{105}$

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

10

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

$0<\sin\alpha(\underbrace{\cos\alpha-1}_{\ominus})\Rightarrow\sin\alpha<0$ } ناحیه چهارم $\Leftarrow$

$0<\cos\alpha<1\Rightarrow -1<\cos\alpha-1<0$