پرهام متقی

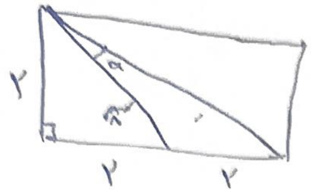
(۱

$\frac{1}{2}ab\sin A = S \Rightarrow 4.5 = \frac{1}{2}\times 3 \times 2\sqrt{3} \times \sin A \Rightarrow \sin A = \frac{\sqrt{3}}{2}$

$A = 60^\circ , 120^\circ$

$\frac{120}{60} = (2)$

(۲



$\sqrt{4+4} = \sqrt{8}$

$\sqrt{16+4} = \sqrt{20}$

$c = \sqrt{a^2+b^2-2ab\cos\alpha}$

$2 = \sqrt{8+20-2\sqrt{160}\cos\alpha}$

$28 - 8\sqrt{10}\cos\alpha$

$4 = 28 - 8\sqrt{10}\cos\alpha$

$8\sqrt{10}\cos\alpha = 24$

$\sqrt{10}\cos\alpha = 3$

$\cos\alpha = \frac{3}{\sqrt{10}}$

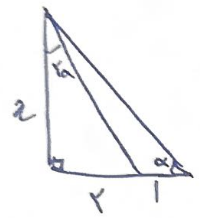
$\sin^2 + \cos^2 = 1$

$\sin^2 + \frac{9}{10} = 1$

$\sin = \frac{1}{\sqrt{10}}$

$\cot\alpha = \frac{\frac{3}{\sqrt{10}}}{\frac{1}{\sqrt{10}}} = (3)$

(۳



$\tan\alpha = \frac{x}{3}$ $\tan 2\alpha = \frac{2}{x}$

$\tan 2\alpha = \frac{2\tan\alpha}{1-\tan^2\alpha} = \frac{\frac{2x}{3}}{\frac{9-x^2}{9}} = \frac{6x}{9-x^2}$

$\frac{6x}{9-x^2} = \frac{2}{x}$

$6x^2 = 18 - 2x^2$

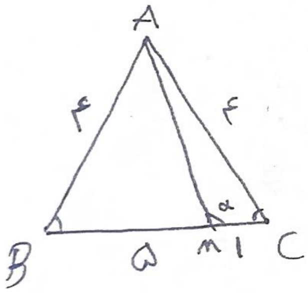
$8x^2 = 18$

$4x^2 = 9$

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

$\cot\alpha = \frac{3}{\frac{3}{2}} = (2)$

(۴



$16 = 16 + 36 - 48\cos C$

$48\cos C = 36$

$4\cos C = 3$

$\cos C = \frac{3}{4}$

$\sin C = \frac{\sqrt{7}}{4}$

$AM = \sqrt{25+16-40\cos C}$

$AM = \sqrt{25+16-30}$

$AM = \sqrt{11}$

$\frac{\sqrt{11}}{\frac{\sqrt{7}}{4}} = \frac{4}{\sin\alpha}$

$\sin\alpha = \frac{\sqrt{7}}{\sqrt{11}}$

$\cos\alpha = -\frac{2}{\sqrt{11}}$

$\tan\alpha = \frac{\frac{\sqrt{7}}{\sqrt{11}}}{\frac{2}{\sqrt{11}}} = \left(\frac{\sqrt{7}}{-2}\right)$

(۵

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

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

$\sin\alpha = \frac{\sqrt{3}}{3}$

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

$\cos\alpha = \frac{\sqrt{2}}{\sqrt{3}}$

$\tan\alpha = \frac{\frac{1}{\sqrt{3}}}{\frac{\sqrt{2}}{\sqrt{3}}} = \frac{1}{\sqrt{2}}$

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

(6

$\frac{\sin^4\alpha+4\cos^2\alpha}{1+\cos^2\alpha}-\frac{\cos^4\alpha+3\sin^2\alpha}{1+\sin^2\alpha}$

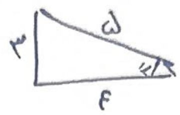
$(\sin^2\alpha)^2=(1-\cos^2)^2=1+\cos^4-2\cos^2$ $\quad$ $(\cos^2\alpha)^2=(1-\sin^2\alpha)^2=1+\sin^4\alpha-2\sin^2\alpha$

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

$\cos^2\alpha-\sin^2\alpha=\cos2\alpha$

(7

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



$\sin\alpha=-\frac{3}{5}$

$\cos\alpha=-\frac{4}{5}$

$-\frac{4}{5}\times+\frac{3}{5}$

$\frac{-12}{25}+\frac{3}{4}=\frac{-48+75}{100}=\frac{27}{100}$

(8

$2\cos4\alpha+\sqrt{2}\sin\alpha-\sqrt{2}\cos\alpha$

$\frac{1}{2}$

(9

$\frac{\tan\alpha-\sin\alpha}{\sin\alpha-\cos\alpha}$

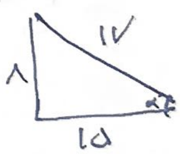
$\tan(\frac{\alpha}{2})=\frac{1}{4}$

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

$\frac{\frac{8}{15}-\frac{8}{17}}{\frac{8}{17}-\frac{15}{17}}=\frac{\frac{136-120}{255}}{\frac{-7}{17}}=\frac{\frac{16}{255}}{-\frac{7}{17}}=-\frac{16}{105}$

$\sin\alpha=\frac{8}{17}$

$\cos\alpha=\frac{15}{17}$



(10

$2\sin\alpha<\sin2\alpha$ $\quad$ $0<\frac{\cot\alpha}{\sin\alpha}$

α ناحیه ۳ $\quad$ α ناحیه ۱ یا ۴

ناحیه چهارم

(8

$3\cos4\alpha+\sqrt{2}(\sin\alpha-\cos\alpha)$

$\sqrt{2}(\sin(\alpha-\frac{\pi}{4}))$

$3\cos\frac{4\pi}{3}+2\sin(\alpha-\frac{\pi}{4})=\frac{3}{2}+2(-\frac{1}{2})=\frac{3}{2}-1=\frac{1}{2}$