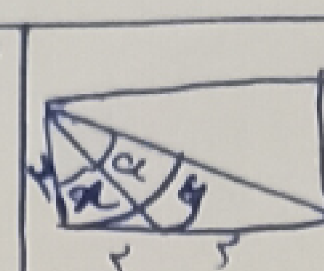
محمد شیرانی ۱۱B

۱- $\frac{6\times\sqrt{3}\times\sin\alpha}{2}=\frac{9}{2}\Rightarrow \sin\alpha=\frac{\sqrt{3}}{2}$ → $\alpha=60^\circ$, $\alpha=120^\circ$

$\frac{\max\alpha}{\min\alpha}=2$

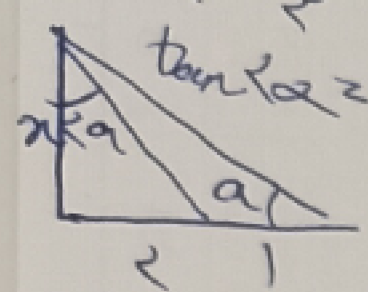
۲- 

$\tan\alpha=\tan(y-x)$

$\tan y=\frac{4}{2}=2$

$\tan x=\frac{2}{2}=1$

$\frac{2-1}{1+2}=\frac{1}{3}$ → $\cot\alpha=3$

۳- 

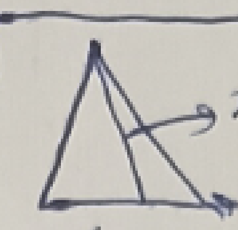
$\tan\alpha=\frac{x}{3}$

$\tan2\alpha=\frac{3}{x}=\frac{2\tan\alpha}{1-\tan^2\alpha}$

$\frac{6x}{9-x^2}=\frac{3}{x}\rightarrow x=\frac{3}{2}$

$\Rightarrow \tan\alpha=\frac{3}{2}\times\frac{1}{3}=\frac{1}{2}$, $\cot\alpha=2$

۴- طبق قضیه استوارت داریم:



$x^2=\frac{16+80}{6}\rightarrow \dots \Rightarrow x=\sqrt{11}$

قضیه کسینوس‌ها: $11+1-2\sqrt{11}\cos\alpha=16\rightarrow \cos\alpha=-\frac{2}{\sqrt{11}}$

$\rightarrow 1+\tan^2\alpha=\frac{1}{\cos^2\alpha}\Rightarrow \tan^2\alpha=\frac{7}{4}\rightarrow \tan\alpha=-\frac{\sqrt{7}}{2}$

۵- $\sin^2\alpha+\underbrace{\sin^2\alpha+\cos^2\alpha}_{1}=\frac{4}{3}$ → $\sin^2\alpha=\frac{1}{3}$, $\cos^2\alpha=\frac{2}{3}$

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

۶- $\sin^4\alpha+4\cos^2\alpha=\sin^4\alpha-4\sin^2\alpha+4$

$\cos^4\alpha+4\sin^2\alpha=\cos^4\alpha-4\cos^2\alpha+4$

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

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

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

$\rightarrow 2-\sin^2\alpha+\cos^2\alpha-2$

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

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

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

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

$\cos\alpha\cdot-\sin\alpha+\cot\alpha=-\sin\alpha\cos\alpha+\frac{\cos\alpha}{\sin\alpha}$

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

$\frac{\cos\alpha\cdot\cos^2\alpha}{\sin\alpha}\rightarrow\frac{\cos^2\alpha}{\sin\alpha}\rightarrow\cot\alpha\cdot\cos^2\alpha$

۸- می‌دانیم:

$\cos\frac{\pi}{12}=\frac{\sqrt{6}+\sqrt{2}}{4}$

$\sin\frac{\pi}{12}=\frac{\sqrt{6}-\sqrt{2}}{4}$

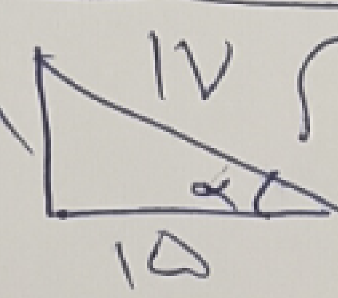
$\sqrt{2}(\sin x-\cos x)=\frac{\sqrt{6}-\sqrt{2}-\sqrt{6}-\sqrt{2}}{4}=\frac{-2\sqrt{2}}{4}=-\frac{\sqrt{2}}{2}$

$\sqrt{2}(-\frac{\sqrt{2}}{2})=-1$

$2\cos4x=2\cos\frac{\pi}{3}=2\times\frac{1}{2}=\frac{3}{2}$

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

۹- $\tan\alpha=\frac{2\tan\frac{\alpha}{2}}{1-\tan^2\frac{\alpha}{2}}=\frac{\frac{1}{2}}{\frac{15}{16}}=\frac{8}{15}\rightarrow$



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

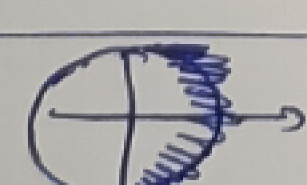
$\cos\alpha=\frac{15}{17}$

$\tan\alpha=\frac{8}{15}$

$\cot\alpha=\frac{15}{8}$

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

۱۰- $0<\frac{\cot\alpha}{\sin\alpha}\Rightarrow 0<\frac{\cos\alpha}{\sin^2\alpha}$ → (+) ⇒



→ ربع ۱ و ۴ $\cos\alpha>0$

$2\sin\alpha<2\sin\alpha\cos\alpha$ — if $\sin\alpha>0$ → $1<\cos\alpha$ → غ ق ق ×

if $\sin\alpha<0$ → $1>\cos\alpha$ → ق ق ✓

ناحیه ۴

finish