۱۲,۲۵

۱ - (۲)

$4\sqrt{3}\sin\alpha = \frac{9}{2}$

$\Rightarrow \sin\alpha = \frac{\sqrt{3}}{2}$ maximum / minimum ۲

۲ - (۲)

$\tan(\alpha+\beta) = 2 = \frac{\tan\alpha + \tan\beta}{1-\tan\alpha\tan\beta}$

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

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

۳ - (۰,۲۵)

$\tan 2\alpha = \cancel{\frac{3}{m}} \quad \tan\alpha = \frac{m}{3}$

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

$3m^2 = 9 \Rightarrow \cancel{m = \sqrt{3}} \Rightarrow \cot\alpha = \cancel{\frac{3}{\sqrt{3}}}$

$\frac{\pi}{12} - \frac{\pi}{4}, \quad \frac{-2\pi}{12} \quad \frac{-\pi}{6}$

۴ - ۰

$= \text{میانه} \sim AD^2 = \frac{80+16}{4} - 13 = 11 \Rightarrow AD = \sqrt{11}$ $\xrightarrow{\text{کسینوس}}$

$\cancel{16 = 14 + 2}$

$16 = 14 + 2\sqrt{11}\cos\alpha \Rightarrow \cos\alpha = 4 - 2\sqrt{11}$

$\Rightarrow \tan^2\alpha + 1 = \frac{1}{(4-2\sqrt{11})^2}$, $\sqrt{\frac{1}{(4-2\sqrt{11})^2} - 1} = \tan\alpha$

۶ - ۰

۵ - (۲)

$\sin^2\alpha = \frac{1}{2} \sim \frac{\sqrt{2}}{2}$

$\Rightarrow \tan\alpha = \frac{2}{4}$

۷ - (۲)

$\cos\alpha \times -\sin\alpha + \cot\alpha = \frac{-3}{5} \times \frac{4}{5} + \frac{3}{4} = \frac{-12}{25} + \frac{3}{4} = \frac{27}{100}$

۸ - (۲)

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

$= 2\sin(-\frac{\pi}{6}) = -1$

۹ - (۲)

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

۱۷, ۸, ۱۵

$\frac{-16}{105}$

۱۰ - ۰

$\sin\alpha \quad \cot\alpha$

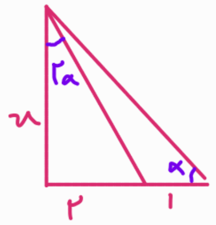
$\Rightarrow$ تقسیم

$\Rightarrow \frac{\frac{8}{15} - \frac{8}{17}}{\frac{8}{17} - \frac{15}{17}}$

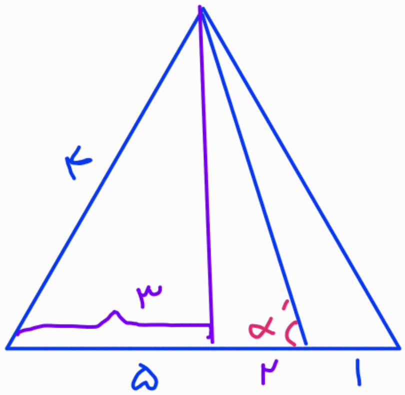
-۳

$$\left.\begin{array}{l}\tan 2\alpha = \dfrac{2}{x} \\ \tan\alpha = \dfrac{x}{3}\end{array}\right\} \frac{2}{x} = \frac{2\left(\frac{x}{3}\right)}{1-\frac{x^2}{9}} \rightarrow x = \frac{3}{2} \rightarrow \tan\alpha = \frac{1}{2}$$

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



-۴



$$h = \sqrt{16-9} = \sqrt{7}$$

$$\tan\alpha' = \frac{\sqrt{7}}{2}$$

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

-۶

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

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

-۱۰

$$\frac{\frac{\cos\alpha}{\sin\alpha}}{\sin\alpha} = \frac{\cos\alpha}{\sin^2\alpha} > 0 \rightarrow \cos\alpha > 0$$

$$2\sin\alpha < \sin 2\alpha \rightarrow \sin\alpha\underbrace{(1-\cos\alpha)}_{+} < 0$$

$$\downarrow$$

$$\sin\alpha < 0$$

$\Big\}$ ربع چهارم