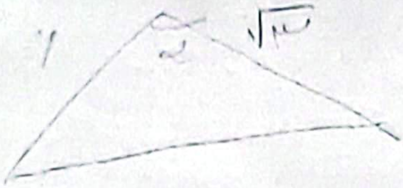


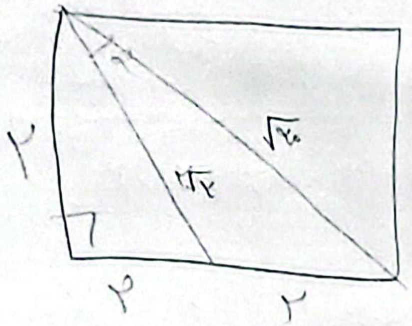
① $\frac{4\sqrt{2}}{2} \times \sin\alpha = 4.5$

امیرحسین نوروزی
یازدهم B ۲۷

$\Rightarrow \sin\alpha = \frac{\sqrt{3}}{2} \Rightarrow \alpha = 60$ یا 120

$\boxed{\frac{a_1}{a_2} = 2}$

②

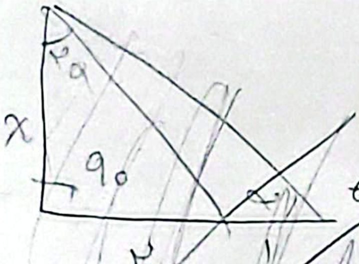


$\Rightarrow \sin\alpha \times \frac{1}{2} \times 2\sqrt{2} \times 2\sqrt{5} = \frac{2\times 2}{2}$

$\Rightarrow 2\sqrt{10}\,\sin\alpha = 2 \Rightarrow \sin\alpha = \frac{\sqrt{10}}{10}$

$\Rightarrow \cos\alpha = \frac{3\sqrt{10}}{10} \Rightarrow \boxed{\cot\alpha = 3}$

③



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

~~$\tan 2\alpha = \frac{2\tan\alpha}{1-\tan^2\alpha} = \frac{\frac{6}{x}}{\frac{x^2-9}{x^2}} = \frac{4}{x} = \frac{6x}{x^2-9} = \frac{4}{x}$~~

$\Rightarrow 3x^2 = 4x^2 - 9 \Rightarrow x^2 + 9 = 0$

④

$\alpha = 90 + \theta$

$\Rightarrow \tan\alpha = \cot\theta \Rightarrow \frac{\sqrt{7}}{2} = \tan\alpha$

⑤

~~$\sin^2 x + \cos^2 x + \sin^2 x = \frac{1}{\frac{\sqrt{3}}{2}}$~~

$\Rightarrow |\sin x| = \frac{\sqrt{3}}{2} \Rightarrow \left|\frac{\sin x}{\cos x}\right| = \frac{\sqrt{2}}{2}$

$$\frac{\cos^4 a + 4\sin^2 a}{} = \frac{\cos^4 a - 4\cos^2 a + 4}{2 - \cos^2 a}$$

$$\Rightarrow -(2-\cos^2 a) + (2 - \sin^2 a) = \cos^2 a - \sin^2 a$$

(1)

(2)

$$\tan\alpha = \frac{4}{3} \Rightarrow \sin\alpha = 4x \quad \cos\alpha = 3x$$

$$\Rightarrow 25x^2 = 1 \Rightarrow \sin\alpha = -\frac{4}{5} \quad \cos\alpha = -\frac{3}{5}$$

$$\cos\alpha \times -(\sin\alpha) + \cot\alpha = \frac{12}{25} + \frac{3}{4} = \frac{123}{100} = 1.23$$

(1)

$$\sqrt{2}\sin\frac{\pi}{12} - \sqrt{2}\cos\frac{\pi}{12} + 2\cos\frac{\pi}{2}$$

$$\sin\frac{\pi}{12} = \sin\left(\frac{\pi}{4} - \frac{\pi}{6}\right) = \sin\frac{\pi}{4}\cdot\cos\frac{\pi}{6} - \sin\frac{\pi}{6}\cos\frac{\pi}{4}$$

$$= \frac{\sqrt{2}}{2}\cdot\frac{\sqrt{3}}{2} - \frac{1}{2}\cdot\frac{\sqrt{2}}{2} = \frac{\sqrt{6}-\sqrt{2}}{4\sqrt{2}}$$

$$\cos\left(\frac{\pi}{3} - \frac{\pi}{4}\right) = \cos\frac{\pi}{3}\cos\frac{\pi}{4} + \sin\frac{\pi}{3}\sin\frac{\pi}{4}$$

$$\frac{\sqrt{2}}{2}\left(\frac{1}{2} + \frac{\sqrt{3}}{2}\right) = \frac{\sqrt{6}+\sqrt{2}}{4\sqrt{2}}$$

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

(9)

$$\tan\left(\frac{\alpha}{2}\right) = \frac{1}{4} \qquad \tan 2\alpha = \frac{2\tan\alpha}{1-\tan^2\alpha}$$

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

$$\Rightarrow \sin\alpha = \frac{8}{17} \quad \cos\alpha = \frac{15}{17} \Rightarrow \frac{\frac{8}{15} - \frac{8}{17}}{\frac{8}{17} - \frac{15}{17}} = \frac{\frac{16}{15\times 17}}{\frac{-7}{17}}$$

$$\frac{16}{-105}$$

(۱)

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

$\sin 2\alpha \neq 0$

$$2\sin 2\alpha < \sin^2 2\alpha \Rightarrow 2\sin 2\alpha < 2\sin\alpha\cos\alpha$$

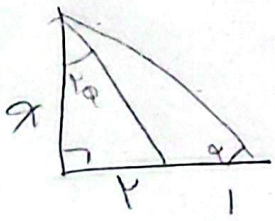
$$\Rightarrow 2\sin\alpha(1-\cos\alpha) < 0$$

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

$\sin 2\alpha < 0$

$\cos 2\alpha > 0 \Longrightarrow$ ناحیه ۴

(۲)



$$\cot\alpha = \frac{۳}{x}$$

$$\cot 2\alpha = \frac{1-\cot^2\alpha}{2\cot\alpha}$$

$$\cot 2\alpha = \frac{۲}{x} \Rightarrow \frac{۲}{x} = \frac{\frac{x^2-9}{x^2}}{\frac{۶}{x}} \Rightarrow \frac{۱۲}{x} = \frac{x^2-9}{x}$$

$$\Rightarrow x^2-9 = ۱۲ \Rightarrow x^2-۲۱ = 0 \Rightarrow x = \pm\sqrt{۲۱}$$

$$\Rightarrow \cot\alpha = \frac{۳}{\sqrt{۲۱}} = \frac{\sqrt{۳}}{\sqrt{۷}}$$