

$$\text{الف)} \tan\left(2\pi + \frac{3\pi}{4}\right) + \sin\left(3\pi + \frac{3\pi}{4}\right) \cos\left(4\pi + \frac{\pi}{4}\right) \Rightarrow \\ = \tan \frac{3\pi}{4} + \sin \frac{3\pi}{4} \cos \frac{\pi}{4} = -1 + \left(-\frac{\sqrt{2}}{2}\right)\left(-\frac{\sqrt{2}}{2}\right) = -1 + \frac{1}{2} = -\frac{1}{2}$$

$$\text{ب)} \tan\left(2\pi + \frac{3\pi}{4}\right) \sin\left(3\pi + \frac{3\pi}{4}\right) + \cos\left(4\pi + \frac{\pi}{4}\right) \Rightarrow \\ = \tan \frac{3\pi}{4} \sin \frac{3\pi}{4} + \cos \frac{\pi}{4} = \frac{1}{-1} \times \left(-\frac{\sqrt{2}}{2}\right) + \left(-\frac{1}{2}\right) = 0$$

$$\cot x = 4 \Rightarrow \tan x = \frac{1}{\cot x} = \frac{1}{4} \quad \tan x + \cot x = \frac{\sin x + \cos x}{\sin x \cos x} = \frac{14}{x} \Rightarrow \\ \Rightarrow \sin x \cos x = \frac{x}{14} \quad 1 + \cot^2 x = \frac{1}{\sin^2 x} \Rightarrow 14 = \frac{1}{\sin^2 x} \Rightarrow \sin^2 x = \frac{1}{14} \\ \cos^2 x = 1 - \sin^2 x = 1 - \frac{1}{14} = \frac{13}{14} \\ \Rightarrow \frac{x \cos^2 x + x \sin^2 x \cos x - \sin^2 x \cos x}{\sin^2 x + \cos^2 x + x \sin x \cos x} = \frac{x \left(\frac{13}{14}\right) + x \left(\frac{1}{14}\right) - \frac{1}{14}}{1 + x \left(\frac{x}{14}\right)} = \frac{11}{14} = \frac{11}{14}$$

$$\sin^2 \alpha + \cos^2 \alpha = 1 \Rightarrow x \cos^2 \alpha + \cos^2 \alpha = 1 \Rightarrow \cos^2 \alpha = \frac{1}{x} \quad \begin{matrix} \text{درج دوم} \\ \cos < 0 \end{matrix}$$

$$\cos \alpha = -\frac{\sqrt{x}}{x}$$

$$\text{الف)} \cos^2 \alpha = 1 - \sin^2 \alpha = 1 - \frac{x}{14} = \frac{9}{14} \quad \begin{matrix} \text{درج دوم} \\ \cos < 0 \end{matrix} \Rightarrow \cos \alpha = -\frac{\sqrt{9}}{\sqrt{14}} = -\frac{\sqrt{14}}{10} \\ \frac{11\pi}{4} = 2\pi + \frac{3\pi}{4} \Rightarrow \cos\left(\frac{11\pi}{4} + \alpha\right) = \cos\left(\frac{3\pi}{4} + \alpha\right) = \cos \frac{3\pi}{4} \cos \alpha - \sin \frac{3\pi}{4} \sin \alpha$$

$$\Rightarrow = \left(-\frac{\sqrt{2}}{2}\right)\left(-\frac{\sqrt{14}}{10}\right) - \left(\frac{\sqrt{2}}{2}\right)\left(\frac{\sqrt{2}}{10}\right) = \frac{4}{10} = \frac{2}{5}$$

$$\text{ب)} 1 + \tan^2 \alpha = \frac{1}{\cos^2 \alpha} = \frac{16}{9} \Rightarrow \cos^2 \alpha = \frac{9}{16} \quad \begin{matrix} \text{درج اول} \\ \cos > 0 \end{matrix} \Rightarrow \cos \alpha = \frac{3}{4} = \frac{\sqrt{9}}{4}$$

$$\sin^2 \alpha = 1 - \cos^2 \alpha = 1 - \frac{9}{16} = \frac{7}{16} \quad \begin{matrix} \text{درج اول} \\ \sin > 0 \end{matrix} \Rightarrow \sin \alpha = \frac{1}{4} = \frac{\sqrt{7}}{10}$$

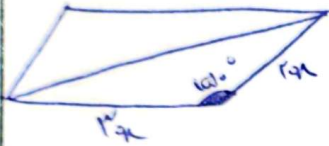
$$\frac{13\pi}{4} = 2\pi + \frac{5\pi}{4} \Rightarrow \sin\left(\frac{13\pi}{4} + \alpha\right) = \sin\left(\frac{5\pi}{4} + \alpha\right) = \sin \frac{5\pi}{4} \cos \alpha + \sin \alpha \cos \frac{5\pi}{4} \\ \Rightarrow = \left(-\frac{\sqrt{2}}{2}\right) \times \frac{\sqrt{9}}{10} + \left(\frac{\sqrt{2}}{10}\right) \times \left(-\frac{\sqrt{7}}{4}\right) = -\frac{3}{10} - \frac{1}{10} = -\frac{4}{10} = -\frac{2}{5}$$

$$\begin{cases} x \sin^2 \alpha + \cos^2 \alpha = \frac{5}{4} \\ \sin^2 \alpha + \cos^2 \alpha = 1 \end{cases} \Rightarrow \sin^2 \alpha = \frac{1}{4} \Rightarrow \cos^2 \alpha = 1 - \frac{1}{4} = \frac{3}{4}$$

$$1 + \tan^2 \alpha = \frac{1}{\cos^2 \alpha} = \frac{4}{3} \Rightarrow \tan^2 \alpha = \frac{1}{3}$$

$$S_{\Delta ABC} = \frac{1}{2} ab \sin \alpha = \frac{1}{2} \times 4 \times \sqrt{3} \times \sin \alpha = 10 \Rightarrow \sin \alpha = \frac{10}{4\sqrt{3}} = \frac{\sqrt{3}}{2}$$

$$\Rightarrow \hat{\alpha} = 60^\circ, 120^\circ \Rightarrow \frac{\alpha \text{ بیشترین مقدار}}{\alpha \text{ کمترین مقدار}} = \frac{120}{60} = 2$$



$$\sin 120^\circ = \sin (180^\circ - 60^\circ) = \sin 60^\circ = \frac{1}{2}$$

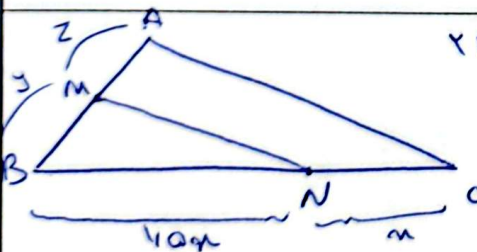
$$S_{\square} = 4 \times \frac{1}{2} \times 4 \times \sin 120^\circ = 4 \times 2 \times \frac{1}{2} = 4 \Rightarrow \alpha = 120^\circ$$

$$\Rightarrow \alpha = 4\sqrt{3}$$

$$P_{\square} = 10\alpha = 10 \times 4\sqrt{3} = 40\sqrt{3}$$

$$\left. \begin{aligned} S_{\Delta ABC} &= \frac{1}{2} \times 4 \times 4 \times \sin \hat{A} = 10 \sin \hat{A} \\ S_{\Delta ADE} &= \frac{1}{2} \times 4 \times 4 \times \sin \hat{A} = 10 \sin \hat{A} \end{aligned} \right\} \Rightarrow S_{\Delta ABC} - S_{\Delta ADE} = 10 \sin \hat{A} = 10 \times \frac{1}{2} = 5$$

$$\Rightarrow \sin \hat{A} = \frac{1}{2} \Rightarrow \hat{A} = 30^\circ \Rightarrow \tan \hat{A} = \frac{\sin \hat{A}}{\cos \hat{A}} = \frac{\frac{1}{2}}{\frac{\sqrt{3}}{2}} = \frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3}$$



$$y \overline{BN} = z \overline{NC} \Rightarrow \overline{BN} = \frac{y}{z} \overline{NC}$$

$$\frac{S_{\Delta ABC}}{S_{\Delta BMN}} = \frac{\frac{1}{2} \times 4 \times 4 \times \sin \hat{B}}{\frac{1}{2} \times y \times z \times \sin \hat{B}} = \frac{16}{yz}$$

$$\Rightarrow 4y + 4z = 9y \Rightarrow 4z = 5y \Rightarrow y = \frac{4}{5}z \Rightarrow \frac{BM}{AM} = \frac{4}{5} = 1.2$$

$$\frac{|\sin \alpha|}{\cos \alpha} = -\frac{\sin \alpha}{\cos \alpha} \Rightarrow |\sin \alpha| = -\sin \alpha \Rightarrow \sin \alpha < 0 \Rightarrow$$

در ربع سوم یا چهارم قرار دارد

$$\frac{1}{|\cos \alpha|} - \frac{\sin \alpha}{\cos \alpha} = \frac{1 + \sin \alpha}{|\cos \alpha|} \Rightarrow |\cos \alpha| = -\cos \alpha \Rightarrow \cos \alpha < 0 \Rightarrow$$

در ربع دوم یا سوم است

$$\frac{1}{-\cos \alpha} - \frac{\sin \alpha}{\cos \alpha} = \frac{-1 - \sin \alpha}{\cos \alpha} = \frac{1 + \sin \alpha}{-\cos \alpha} = \frac{1 + \sin \alpha}{|\cos \alpha|}$$

(1) (2)

انتقال کمان α در نیمه شیب است.