

الف) $\tan \frac{11\pi}{4} + \sin \frac{10\pi}{4} \times \cos \frac{1\pi}{4}$

$$\frac{11\pi}{4} = \frac{\pi}{4} \rightarrow \alpha = 45^\circ \rightarrow 45^\circ - 360^\circ = 135^\circ \rightarrow \tan 135^\circ = -1$$

$$\frac{10\pi}{4} = \frac{5\pi}{2} \rightarrow \alpha = 270^\circ \rightarrow 270^\circ - 360^\circ = 90^\circ \rightarrow \sin 90^\circ = 1$$

$$\frac{1\pi}{4} = \frac{\pi}{4} \rightarrow \alpha = 45^\circ \rightarrow 45^\circ - 360^\circ = 315^\circ \rightarrow \cos 315^\circ = \frac{\sqrt{2}}{2}$$

$$\rightarrow -1 + 1 \times \frac{\sqrt{2}}{2} = -1 + \frac{\sqrt{2}}{2} = \frac{-2 + \sqrt{2}}{2}$$

ب) $\tan \frac{14\pi}{9} \sin \frac{11\pi}{4} + \cos \frac{10\pi}{9}$

$$\frac{14\pi}{9} = \frac{2\pi}{9} \rightarrow \alpha = 40^\circ \rightarrow 40^\circ - 360^\circ = 160^\circ \rightarrow \tan 160^\circ = -\frac{\sqrt{5}}{2}$$

$$\frac{11\pi}{4} = \frac{5\pi}{4} \rightarrow \alpha = 225^\circ \rightarrow 225^\circ - 360^\circ = 135^\circ \rightarrow \sin 135^\circ = \frac{\sqrt{2}}{2}$$

$$\frac{10\pi}{9} = \frac{2\pi}{9} \rightarrow \alpha = 40^\circ \rightarrow 40^\circ - 360^\circ = 320^\circ \rightarrow \cos 320^\circ = \frac{1}{2}$$

$$\rightarrow -\frac{\sqrt{5}}{2} \times \frac{\sqrt{2}}{2} + \frac{1}{2} = \frac{-\sqrt{10} + 1}{2}$$

$$\frac{\cos x}{\sin x} = k \rightarrow \cos x = k \sin x$$

$$\frac{3k \sin x - \sin x}{k \sin x + \sin x} = \frac{11}{5}$$

$$\sin^2 \alpha + \cos^2 \alpha = 1 \rightarrow k^2 \cos^2 \alpha + \cos^2 \alpha = 1 \rightarrow \Delta \cos^2 \alpha = 1 \rightarrow \cos^2 \alpha = \frac{1}{\Delta}$$

$$\cos \alpha = \pm \frac{1}{\sqrt{\Delta}} \rightarrow \text{منفی قابل قبول است زیرا در ربع سوم است} \quad \cos \alpha = -\frac{1}{\sqrt{\Delta}}$$

الف) $\sin^2 \alpha + \cos^2 \alpha = 1 \rightarrow \frac{1}{10} + \cos^2 \alpha = 1 \rightarrow \cos^2 \alpha = \frac{9}{10} \rightarrow \cos \alpha = \pm \frac{3\sqrt{10}}{10}$

$$\frac{11\pi}{4} = 2\pi + \frac{3\pi}{4} \rightarrow \begin{cases} \sin \frac{11\pi}{4} = \frac{\sqrt{2}}{2} \\ \cos \frac{11\pi}{4} = \frac{\sqrt{2}}{2} \end{cases}$$

$$\cos(\alpha + \beta) = \cos \alpha \cos \beta - \sin \alpha \sin \beta$$

$$\frac{14\pi}{9} \alpha \quad \left(-\frac{\sqrt{2}}{2} \times -\frac{\sqrt{10}}{10} \right) - \left(\frac{\sqrt{2}}{2} \times \frac{3\sqrt{10}}{10} \right) = \frac{1}{10} - \frac{3}{10} = -\frac{2}{10} = -\frac{1}{5}$$

ب) $1 + \tan^2 \alpha = \frac{1}{\cos^2 \alpha} \rightarrow 1 + \frac{1}{9} = \frac{10}{9} = \frac{\sqrt{10}}{\sqrt{10}} = \frac{1}{\cos} \rightarrow \cos = \frac{\sqrt{10}}{10} \rightarrow \sin^2 = 1 - \frac{1}{10} = \frac{9}{10} \rightarrow \sin = \pm \frac{3\sqrt{10}}{10}$

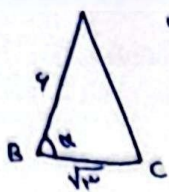
$$\frac{13\pi}{4} = 2\pi + \frac{5\pi}{4} \rightarrow \begin{cases} \sin = -\frac{\sqrt{2}}{2} \\ \cos = -\frac{\sqrt{2}}{2} \end{cases}$$

$$\sin\left(\frac{14\pi}{9} + \alpha\right) = \sin \frac{14\pi}{9} \cos \alpha + \sin \alpha \cos \frac{14\pi}{9} = \left(-\frac{\sqrt{2}}{2} \times \frac{1}{\sqrt{10}}\right) - \left(-\frac{\sqrt{2}}{2} \times \frac{\sqrt{10}}{10}\right) = -\frac{\sqrt{2}}{2\sqrt{10}} + \frac{\sqrt{2}}{2\sqrt{10}}$$

$$\begin{cases} \sin^2 x + \cos^2 x = \frac{1}{4} \\ (\sin^2 x + \cos^2 x = 1) \times -1 \end{cases} \rightarrow \frac{3}{4} + \cos^2 x = 1 \rightarrow \cos^2 x = \frac{1}{4} \rightarrow \cos x = \pm \frac{1}{2}$$

$$\sin^2 x = \frac{3}{4} \quad \sin x = \pm \frac{\sqrt{3}}{2}$$

$$\tan^2 x = \left(\frac{\frac{\sqrt{3}}{2}}{\frac{1}{2}}\right)^2 = \left(\frac{\sqrt{3}}{1}\right)^2 = 3$$



$$S = \frac{1}{2} \times AB \times BC \times \sin \alpha$$

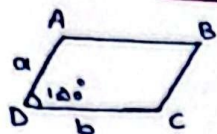
$$\frac{\frac{1}{2} \times \sqrt{r} \times \sin \alpha}{\frac{1}{2}} = r \times \frac{1}{r} \rightarrow \sin \alpha = \frac{\sqrt{r}}{r}$$

$$\max \alpha = 110^\circ$$

$$\min \alpha = 90^\circ$$

$$1/r = r \times \frac{1}{r}$$

$$\downarrow$$



$$S = ab \times \frac{\sin 10^\circ}{\frac{1}{r}} = \Delta F \rightarrow ab = 10\Delta$$

$$\rightarrow \frac{1}{r} a \times a = \frac{1}{r} a^2 = 10\Delta \rightarrow$$

$$\frac{a}{b} = \frac{r}{r} \rightarrow r b = r a \rightarrow b = \frac{r}{r} a$$

$$a^2 = 10\Delta \times \frac{r}{r} \rightarrow a = \sqrt{10\Delta}$$

$$b = \frac{r}{r} \sqrt{10\Delta}$$

$$\underline{\underline{b}} = \sqrt{10\Delta} + \frac{r}{r} \sqrt{10\Delta} = \Delta \sqrt{10\Delta}$$

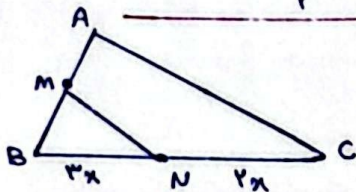
$$S_{ABC} - S_{ADE} = 1/r \Delta$$

$$V \times \Delta \times \frac{1}{r} \times \sin \alpha - V \times r \times \frac{1}{r} \times \sin \alpha = 1/r \Delta$$

$$\frac{r \Delta}{r} \times \sin \alpha - 1/r \times \sin \alpha = 1/r \Delta$$

$$\rightarrow r \Delta \sin \alpha = 1/r \Delta \rightarrow \sin \alpha = \frac{1}{r} \rightarrow \alpha = 10^\circ$$

$$\tan 10^\circ = \frac{\frac{1}{r}}{\frac{\sqrt{r}}{r}} = \frac{\sqrt{r}}{r}$$



$$\frac{S_{BMN}}{S_{ABC}} = \frac{BM \times BN}{BA \times BC} = \frac{BM}{BA} \times \frac{r}{\Delta} = \frac{1}{r}$$

$$\rightarrow \frac{BM}{BA} = \frac{\Delta}{r} \rightarrow \frac{BM}{AM} = \frac{\Delta}{r} = 1/r \Delta$$

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

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

$$\rightarrow \frac{1}{-\cos \alpha} + \frac{\sin \alpha}{-\cos \alpha}$$

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

دارد $\cos$ و $\sin$ در سمت چپ را

$$\rightarrow \sin \alpha < 0, \cos \alpha < 0$$

