

الف) $\tan \frac{11\pi}{4} + \sin \frac{15\pi}{4} \cos \frac{13\pi}{4} = \tan \left(\frac{1\pi}{4} + \frac{3\pi}{4} \right) + \sin \left(\frac{12\pi}{4} + \frac{3\pi}{4} \right) \cos \left(\frac{12\pi}{4} + \frac{\pi}{4} \right) = -1 + \frac{\sqrt{2}}{2} \times \frac{\sqrt{2}}{2} = \frac{-1}{2}$

ب) $\tan \frac{17\pi}{6} \sin \frac{11\pi}{3} + \cos \frac{10\pi}{3} = \tan \left(\frac{14\pi}{6} + \frac{3\pi}{6} \right) \sin \left(\frac{8\pi}{6} + \frac{3\pi}{6} \right) + \cos \left(\frac{8\pi}{6} + \frac{2\pi}{6} \right) = \frac{-\sqrt{3}}{3} \times \left(\frac{\sqrt{3}}{2} \right) + \frac{1}{2} = 0$

$\cot x = \frac{1}{\tan x} = \frac{1}{\frac{1}{\sqrt{14}}} = \sqrt{14}$

$\cos x = \frac{1}{\sqrt{15}}$

$\sin x = \frac{1}{\sqrt{15}}$

$\frac{3 \cos x - \sin x}{\cos x + \sin x} = \frac{3 \left(\frac{1}{\sqrt{15}} \right) - \frac{1}{\sqrt{15}}}{\frac{1}{\sqrt{15}} + \frac{1}{\sqrt{15}}} = \frac{\frac{2}{\sqrt{15}}}{\frac{2}{\sqrt{15}}} = 1$

$\sin^2 x + \cos^2 x = 1 \Rightarrow (\cos x)^2 + \cos^2 x = 1 \Rightarrow 2 \cos^2 x = 1 \Rightarrow \cos^2 x = \frac{1}{2} \Rightarrow \cos x = \pm \frac{1}{\sqrt{2}} = \pm \frac{\sqrt{2}}{2}$

چون ناحیه معلوم است منفی قابل قبول است

الف) $\cos \left(\frac{11\pi}{4} + x \right) = \cos \left(2\pi + \frac{3\pi}{4} + x \right) = \cos \left(\frac{3\pi}{4} + x \right) = \cos \frac{3\pi}{4} \cos x - \sin \frac{3\pi}{4} \sin x = -\frac{\sqrt{2}}{2} \cos x - \frac{\sqrt{2}}{2} \sin x$

$\cos^2 x - \sin^2 x = 1 - \left(\frac{\sqrt{2}}{2} \right)^2 = 1 - \frac{1}{2} = \frac{1}{2} \Rightarrow \cos^2 x = \frac{1}{2} \Rightarrow \cos x = \pm \frac{1}{\sqrt{2}} = \pm \frac{\sqrt{2}}{2}$

چون ناحیه دوم است

ب) $\sin \left(\frac{13\pi}{4} + x \right) = \sin \left(\frac{1\pi}{4} + \frac{5\pi}{4} + x \right) = \sin \left(\frac{5\pi}{4} + x \right) = \left(-\frac{\sqrt{2}}{2} \right) \cos x + \left(-\frac{\sqrt{2}}{2} \right) \sin x = -\frac{\sqrt{2}}{2} (\cos x + \sin x)$

$\tan^2 x + 1 = \frac{1}{\cos^2 x} \Rightarrow \left(\frac{1}{\sqrt{2}} \right)^2 + 1 = \frac{1}{\cos^2 x} \Rightarrow \cos^2 x = \frac{1}{2} \Rightarrow \cos x = \pm \frac{1}{\sqrt{2}} = \pm \frac{\sqrt{2}}{2}$

چون ناحیه اول است

$\sin^2 x = 1 - \cos^2 x = 1 - \left(\frac{\sqrt{2}}{2} \right)^2 = 1 - \frac{1}{2} = \frac{1}{2} \Rightarrow \sin x = \pm \frac{1}{\sqrt{2}} = \pm \frac{\sqrt{2}}{2}$

چون ناحیه اول است

$2 \sin^2 x + \cos^2 x = \frac{4}{3} \Rightarrow 2(1 - \cos^2 x) + \cos^2 x = \frac{4}{3} \Rightarrow 2 - 2\cos^2 x + \cos^2 x = \frac{4}{3} \Rightarrow 2 - \cos^2 x = \frac{4}{3} \Rightarrow \cos^2 x = \frac{2}{3} \Rightarrow \cos x = \pm \frac{\sqrt{6}}{3}$

$\sin^2 x = 1 - \cos^2 x = 1 - \frac{2}{3} = \frac{1}{3} \Rightarrow \sin x = \pm \frac{1}{\sqrt{3}} = \pm \frac{\sqrt{3}}{3}$

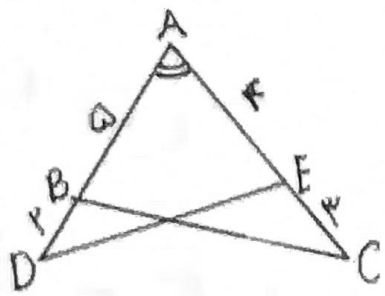
چون ناحیه اول است

$S_{ABC} = \frac{1}{2} \times \sqrt{3} \times \sqrt{3} \sin x = \frac{3}{2} \sin x = \frac{3}{2} \times \frac{\sqrt{3}}{3} = \frac{\sqrt{3}}{2}$

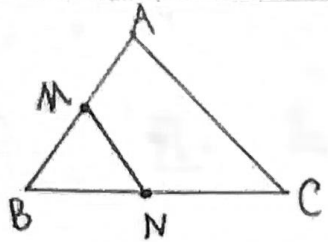
$\alpha = \frac{2\pi}{3}$

$a = 2x, b = 3x \Rightarrow S = ab \sin x = (2x)(3x) \sin 150^\circ = 6x^2 \times \frac{1}{2} = 3x^2 = 3 \Rightarrow x = \sqrt{3} \Rightarrow a = 2(\sqrt{3}) = 2\sqrt{3}, b = 3(\sqrt{3}) = 3\sqrt{3}$

$P = 2(2\sqrt{3} + 3\sqrt{3}) = 10\sqrt{3}$



$$\left. \begin{aligned} S_{ABC} &= \frac{1}{2} \times \omega \times V \times \sin \hat{A} = 1/2 \omega \sin \hat{A} \\ S_{ADE} &= \frac{1}{2} \times V \times \epsilon \times \sin \hat{A} = 1/2 \epsilon \sin \hat{A} \end{aligned} \right\} \Rightarrow 1/2 \omega \sin \hat{A} = 1/2 \epsilon \sin \hat{A} = 1/2 \omega \sin \hat{A} = 1/2 \epsilon \sin \hat{A} \Rightarrow \sin \hat{A} = \frac{1}{\sqrt{3}} \Rightarrow \hat{A} = 30^\circ \Rightarrow \tan 30^\circ = \left(\frac{1}{\sqrt{3}} \right)$$



$$\begin{aligned} S_{ABC} &= 4 S_{BMN} \Rightarrow \frac{1}{2} \times \overline{AB} \times \overline{BC} \times \sin \hat{B} = 4 \times \frac{1}{2} \times \overline{BM} \times \overline{BN} \times \sin \hat{B} \Rightarrow \\ (\overline{AM} + \overline{MB}) \times (\overline{BN} + \overline{NC}) &= 4 (\overline{BM} \times \overline{BN}) \Rightarrow (\overline{AM} + \overline{MB}) \times \frac{\omega}{3} \overline{BN} = 4 \times \overline{BM} \times \overline{BN} \Rightarrow \\ \frac{\omega}{3} \overline{AM} + \frac{\omega}{3} \overline{MB} &= 4 \overline{BM} \Rightarrow \overline{BM} = \frac{\omega}{4} \overline{AM} \Rightarrow \\ \frac{BM}{AM} &= \frac{\omega}{4} = \left(\frac{\omega}{4} \right) \end{aligned}$$

بناهم: $2BN = 3CN \Rightarrow$
 $CN = \frac{2}{3} BN \Rightarrow$
 $\overline{BN} + \overline{NC} = \frac{\omega}{3} \overline{BN}$

$$\textcircled{1} \frac{1}{\sqrt{\cos^2 \alpha}} - \tan \alpha = \frac{1 + \sin \alpha}{|\cos \alpha|} \Rightarrow -\tan \alpha = \frac{1 + \sin \alpha - 1}{|\cos \alpha|} = \frac{\sin \alpha}{|\cos \alpha|}$$

$$\textcircled{2} \frac{|\sin \alpha|}{\cos \alpha} = -\frac{1}{\cot \alpha} \Rightarrow \frac{|\sin \alpha|}{\cos \alpha} = -\tan \alpha$$

$$\textcircled{1} \text{ طبق } \Rightarrow \frac{-\sin \alpha}{\cos \alpha} = \frac{\sin \alpha}{|\cos \alpha|} \xrightarrow{\times \frac{1}{\sin \alpha}} \frac{-1}{\cos \alpha} = \frac{1}{|\cos \alpha|} \Rightarrow +\cos \alpha = -|\cos \alpha| \Rightarrow \cos \alpha < 0$$

$$\textcircled{2} \text{ طبق } \Rightarrow \frac{-\sin \alpha}{\cos \alpha} = \frac{|\sin \alpha|}{\cos \alpha} \Rightarrow -\sin \alpha = |\sin \alpha| \Rightarrow \sin \alpha < 0$$

$\Rightarrow \left\{ \begin{aligned} &\cos \alpha < 0 \\ &\sin \alpha < 0 \end{aligned} \right\} \Rightarrow \alpha \text{ في الربع الثالث}$