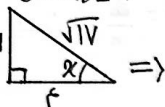


الف) $\tan \frac{11\pi}{4} + \sin \frac{15\pi}{4} \cos \frac{13\pi}{4} = \tan \left(\frac{1\pi}{4} + \frac{3\pi}{4} \right) + \sin \left(\frac{12\pi}{4} + \frac{3\pi}{4} \right) \cos \left(\frac{12\pi}{4} + \frac{\pi}{4} \right) = -1 + \frac{\sqrt{2}}{2} \times \frac{\sqrt{2}}{2} = \frac{-1}{2}$

ب) $\tan \frac{17\pi}{6} \sin \frac{11\pi}{3} + \cos \frac{10\pi}{3} = \tan \left(\frac{14\pi}{6} + \frac{3\pi}{6} \right) \sin \left(\frac{8\pi}{6} + \frac{4\pi}{6} \right) + \cos \left(\frac{8\pi}{6} + \frac{2\pi}{6} \right) = \frac{-\sqrt{3}}{3} \times \left(\frac{1}{2} + \frac{\sqrt{3}}{2} \right) + \frac{1}{2} = 0$

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



$\Rightarrow$

$\cos x = \frac{1}{\sqrt{16}} = \frac{1}{4}$

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

$\frac{3 \cos x - \sin x}{\cos x + \sin x} = \frac{3 \left(\frac{1}{4} \right) - \frac{1}{\sqrt{15}}}{\frac{1}{4} + \frac{1}{\sqrt{15}}} = \frac{\frac{11}{4}}{\frac{4 + \sqrt{15}}{4}} = \frac{11}{4 + \sqrt{15}}$

$\sin x = \sqrt{1 - \cos^2 x}$, $\sin^2 + \cos^2 = 1 \Rightarrow (\cos x)^2 + \cos^2 x = 1 \Rightarrow 4 \cos^2 + \cos^2 = 1 \Rightarrow 5 \cos^2 = 1 \Rightarrow \cos x = \pm \frac{1}{\sqrt{5}} = \pm \frac{\sqrt{5}}{5}$

چون ناحیه سوم است منفی قابل قبول است

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

$\cos^2 x - \sin^2 x = 1 - \left(\frac{\sqrt{2}}{2} \right)^2 = + \frac{1}{2} \Rightarrow \cos x = \pm \frac{1}{\sqrt{2}} \left\{ \begin{array}{l} \left(\frac{-\sqrt{2}}{2} \right) \left(\frac{-\sqrt{2}}{2} \right) - \left(\frac{\sqrt{2}}{2} \right) \left(\frac{\sqrt{2}}{2} \right) = \frac{1}{2} - \frac{1}{2} = 0 \\ \left(\frac{\sqrt{2}}{2} \right) \left(\frac{-\sqrt{2}}{2} \right) - \left(\frac{-\sqrt{2}}{2} \right) \left(\frac{\sqrt{2}}{2} \right) = -\frac{1}{2} - \frac{1}{2} = -1 \end{array} \right.$

ناحیه دوم است

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

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

چون ناحیه اول است

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

چون ناحیه اول است

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

$S_{ABC} = \frac{1}{2} \times \sqrt{3} \times 1 \times \sin x = \frac{1}{2} \times \sqrt{3} \Rightarrow \sin x = \frac{\sqrt{3}}{2}$, $0 < x < \pi \Rightarrow x = \frac{\pi}{3}$ یا $\frac{2\pi}{3}$

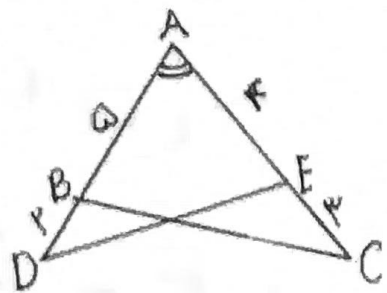
① $x = \frac{\pi}{3}$ $\Rightarrow \frac{1}{2} \times \sqrt{3} \times 1 \times \frac{1}{2} = \frac{\sqrt{3}}{4}$

② $x = \frac{2\pi}{3}$ $\Rightarrow \frac{1}{2} \times \sqrt{3} \times 1 \times \frac{\sqrt{3}}{2} = \frac{3}{4}$

پس $\frac{\sqrt{3}}{4} + \frac{3}{4} = \frac{3 + \sqrt{3}}{4}$

$a = 2x, b = 3x \Rightarrow S = ab \sin x = (2x)(3x) \sin 150^\circ = 6x^2 \times \frac{1}{2} = 3x^2 = 48 \Rightarrow x = 4\sqrt{2} \Rightarrow a = 8\sqrt{2}, b = 12\sqrt{2} \Rightarrow \sqrt{a^2 + b^2} = 16\sqrt{5}$

$P = 2(8\sqrt{2} + 12\sqrt{2}) = 40\sqrt{2}$



$$S_{ABC} = \frac{1}{2} \times 6 \times 1 \times \sin \hat{A} = 3 \sin \hat{A}$$

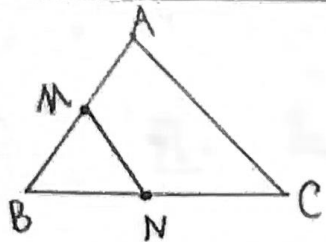
$$S_{ADE} = \frac{1}{2} \times 2 \times 1 \times \sin \hat{A} = \sin \hat{A}$$

$$S_{BDE} = \frac{1}{2} \times 1 \times 2 \times \sin \hat{A} = \sin \hat{A}$$

$$S_{CDE} = \frac{1}{2} \times 1 \times 3 \times \sin \hat{A} = 1.5 \sin \hat{A}$$

$$3 \sin \hat{A} = \sin \hat{A} + \sin \hat{A} + 1.5 \sin \hat{A} \Rightarrow 3 \sin \hat{A} = 3.5 \sin \hat{A} \Rightarrow \sin \hat{A} = 0$$

-1



$$S_{ABC} = 4 S_{BMN} \Rightarrow \frac{1}{2} \times AB \times BC \times \sin \hat{B} = 4 \times \frac{1}{2} \times BM \times BN \times \sin \hat{B} \Rightarrow$$

$$(AM + MB) \times (BN + NC) = 4 (BM \times BN) \Rightarrow (AM + MB) \times \frac{4}{3} BN = 4 \times BM \times BN \Rightarrow$$

$$\frac{4}{3} AM + \frac{4}{3} MB = 4 BM \Rightarrow \frac{4}{3} AM = \frac{8}{3} BM \Rightarrow \frac{AM}{BM} = \frac{2}{1} \Rightarrow \frac{BM}{AM} = \frac{1}{2}$$

$$\frac{BM}{AM} = \frac{1}{2} \Rightarrow \frac{BM}{AM} = \frac{1}{2} \Rightarrow \frac{BM}{AM} = \frac{1}{2}$$

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

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

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

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

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