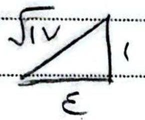
۱) الف) $\tan\frac{11\pi}{4} + \sin\frac{15\pi}{4} \times \cos\frac{14\pi}{4} = \tan\frac{3\pi}{4} + \sin\frac{7\pi}{4} \times \cos\frac{5\pi}{3} =$

$\tan(135^\circ) + (\sin(315^\circ) \times \cos(225^\circ)) = -1 + \left(-\frac{\sqrt{2}}{2} \times -\frac{\sqrt{2}}{2}\right) = -\frac{1}{2}$

ب) $\tan\frac{17\pi}{6}\sin\frac{11\pi}{3} + \cos\frac{10\pi}{3} = \tan\frac{5\pi}{6} \times \sin\frac{5\pi}{3} + \cos\frac{4\pi}{3}$

$(\tan(150^\circ) \times \sin(300^\circ)) + \cos(240^\circ) = \frac{3}{6} - \frac{1}{2} = \frac{1}{2} - \frac{1}{2} = 0$

۲) $\cot a = 4 \rightarrow \frac{\text{مجاور}}{\text{مقابل}}$



$\cos = \frac{4}{\sqrt{17}}$

$\sin = \frac{1}{\sqrt{17}}$

$\frac{3\cos x - \sin x}{\cos x + \sin x} = \frac{3 \times \frac{4}{\sqrt{17}} - \frac{1}{\sqrt{17}}}{\frac{4}{\sqrt{17}} + \frac{1}{\sqrt{17}}} = \frac{\frac{11}{\sqrt{17}}}{\frac{5}{\sqrt{17}}} = \frac{11}{5}$

۳) $\sin\alpha = 2\cos\alpha$

$\sin^2 + \cos^2 = 1$

$4\cos^2 + \cos^2 = 1$

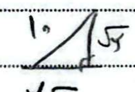
$5\cos^2 = 1$

$\cos^2 = \frac{1}{5} \rightarrow \cos\alpha = +\frac{1}{\sqrt{5}}$ غیرقابل‌قبول چون در ناحیه سوم

$\rightarrow -\frac{1}{\sqrt{5}}$ ✓

۴) الف) sin(+) cos(−)

$\sin = \frac{\sqrt{2}}{10}$

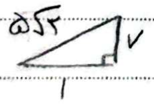


$\cos\left(\frac{11\pi}{4} + \alpha\right) = \cos\left(\frac{3\pi}{4} + \alpha\right) = \cos\left(\frac{3\pi}{4}\right)\cos\alpha - \sin\left(\frac{3\pi}{4}\right)\sin\alpha \rightarrow$

$\left(-\frac{\sqrt{2}}{2} \times -\frac{7\sqrt{2}}{10}\right) - \left(\frac{\sqrt{2}}{2} \times \frac{\sqrt{2}}{10}\right) = \frac{14}{20} - \frac{2}{20} = \frac{3}{5}$

ب) sin(−) cos(+)

$\tan = \frac{1}{7}$



$\sin\left(\frac{13\pi}{4} + \alpha\right) = \sin\left(\frac{5\pi}{4} + \alpha\right) = \sin\left(\frac{5\pi}{4}\right)\cos\alpha + \sin\alpha\cos\left(\frac{5\pi}{4}\right) \rightarrow$

$\left(-\frac{\sqrt{2}}{2} \times \frac{7}{5\sqrt{2}}\right) + \left(\frac{1}{5\sqrt{2}} \times -\frac{\sqrt{2}}{2}\right) = -\frac{7\sqrt{2}}{10\sqrt{2}} - \frac{\sqrt{2}}{10\sqrt{2}} = -\frac{4}{5}$

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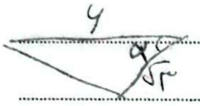
(۵)

$۲\sin^۲x+\cos^۲x=\frac{۴}{۳} \to ۲\sin^۲x+(۱-\sin^۲x)=\frac{۴}{۳} \to \sin^۲x+۱=\frac{۴}{۳} \to$

$\sin^۲x=\frac{۱}{۳} \qquad \cos^۲x=\frac{۲}{۳} \qquad \tan^۲x=\frac{\sin^۲x}{\cos^۲x}=\frac{\frac{۱}{۳}}{\frac{۲}{۳}}=\boxed{\frac{۱}{۲}}$

(۶)



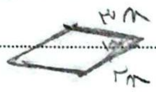
$S_{\alpha}=\frac{۱}{۲}\times۶\times\sqrt{۳}\times\sin\alpha=۴٫۵ \to ۳\sqrt{۳}\sin\alpha=\frac{۹}{۲}$

$\boxed{\sin\alpha=\frac{۳}{۲\sqrt{۳}}}=\frac{\sqrt{۳}}{۲}$

$\sin\alpha=\frac{\sqrt{۳}}{۲} \to ۶۰°$ یا α یا $۱۲۰° \to \frac{۱۲۰}{۶۰}=\boxed{۲}$

(۷)

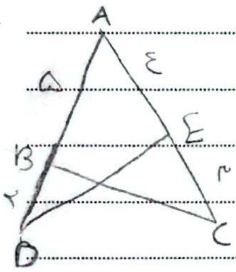
$S=۵۴ \to S=۳x\times۴x\times\sin(۱۵۰°)\times\cancel{۲}\times\cancel{\frac{۱}{۲}} \Rightarrow ۶x^۲\times\frac{۱}{۲}=۵۴$



$x^۲=۱۸ \to x=\sqrt{۱۸}$

محیط $=۲\left((۳\times\sqrt{۱۸})+(۴\times\sqrt{۱۸})\right)=\boxed{۳۰\sqrt{۲}}$

(۸)



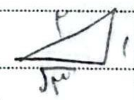
$S_{ABC}-S_{ADE}=۱٫۷۵ \to$

$\left(\frac{۱}{۲}\times۷\times۵\times\sin A\right)-\left(\frac{۱}{۲}\times۷\times۴\times\sin A\right) \to$

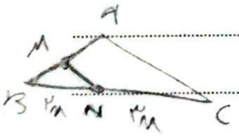
$\frac{۷}{۲}\times\sin A\,(\cancel{۵-۴})=\frac{۷}{۴} \to \sin A=\frac{۱}{۲}$

$\boxed{۱٫۷۵=\frac{۷}{۴}}$

$\cos A=\frac{\sqrt{۳}}{۲}$ } $\boxed{\tan=\frac{۱}{\sqrt{۳}}}$



(۹)



$S_{ABC}=۳S_{BMN}$

$\frac{S_{ABC}}{S_{BMN}}=\frac{\cancel{\frac{۱}{۲}}\times AB\times۵x\times\sin B}{\cancel{\frac{۱}{۲}}\times BM\times۲x\times\sin B}=۳ \Rightarrow \frac{AB}{BM}=\frac{۵}{۹}$

$\frac{BM}{BM+AM}=\frac{۵}{۹} \to BM=۵x,\ AM=۴x$ } $\boxed{\frac{BM}{AM}=\frac{۵}{۴}}$

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

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

cos منفی بوده که کسر هم منفی شده

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

$$\frac{|\cos\alpha|}{\cos\alpha} = -\frac{1}{\cot\alpha} \rightarrow \frac{|\sin\alpha|}{\cos\alpha} = -\frac{\sin\alpha}{\cos\alpha} \rightarrow \boxed{\sin\alpha < 0}$$

مخرج کسر ها برابر

ناصیه سوم.