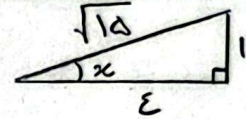


$$(۱) \tan \frac{11\pi}{8} + \sin \frac{15\pi}{8} \cos \frac{13\pi}{8} = \tan(135^\circ) + \left(\underbrace{\sin(315^\circ)}_{-\frac{\sqrt{2}}{2}} \times \underbrace{\cos(225^\circ)}_{-\frac{\sqrt{2}}{2}} \right) = -1 + \frac{2}{2} = \boxed{\frac{1}{2}}$$

$$(۲) \tan \frac{11\pi}{4} \sin \frac{11\pi}{4} + \cos \frac{10\pi}{3} = \left(\tan(135^\circ) \times \sin(300^\circ) \right) + \cos(120^\circ) = \frac{2}{4} - \frac{1}{2} = \frac{1}{2} - \frac{1}{2} = \boxed{0}$$

$$\cot x = 2$$

$$\frac{2 \cos x - \sin x}{\cos x + \sin x} = \frac{2 \left(\frac{2}{\sqrt{5}} \right) - \frac{1}{\sqrt{5}}}{\frac{2}{\sqrt{5}} + \frac{1}{\sqrt{5}}} = \frac{\frac{4-1}{\sqrt{5}}}{\frac{3}{\sqrt{5}}} = \boxed{\frac{11}{5}}$$



$$\sin \alpha = 2 \cos \alpha$$

$$\sin -$$

$$\cos -$$

$$110^\circ < \alpha < 270^\circ$$

$$-1 < \sin \alpha < 0$$

$$-1 < \cos \alpha < 0$$

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

$$\Rightarrow (2 \cos)^2 + \cos^2 = 1$$

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

$$\Rightarrow 5 \cos^2 = 1$$

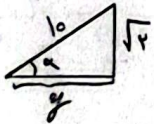
$$\Rightarrow \cos^2 = \frac{1}{5}$$

$$\Rightarrow \cos = \boxed{-\frac{1}{\sqrt{5}}}$$

$$(۳) \frac{\sin \alpha + \cos \alpha}{\sin \alpha} = \frac{\sqrt{5}}{10}$$

$$\cos \left(\frac{11\pi}{8} + \alpha \right) = \cos \left(\frac{3\pi}{8} + \alpha \right) = \cos \left(\frac{3\pi}{8} \right) \cos \alpha - \sin \left(\frac{3\pi}{8} \right) \sin \alpha$$

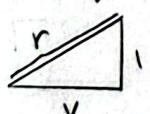
$$\Rightarrow \left(-\frac{\sqrt{2}}{2} \times -\frac{\sqrt{2}}{10} \right) - \left(\frac{\sqrt{2}}{2} \times \frac{\sqrt{2}}{10} \right) = \frac{+12}{40} - \frac{2}{40} = \frac{10}{40} = \boxed{\frac{3}{10}}$$



$$y = 100 - 2 = 98 \rightarrow \sqrt{98} = 7\sqrt{2}$$

$$(۴) \frac{\sin \alpha + \cos \alpha}{\tan \alpha} = \frac{1}{\sqrt{5}}$$

$$\tan \alpha = \frac{1}{\sqrt{5}}$$



$$r = 29 + 1 = 30 \rightarrow \sqrt{30} = 3\sqrt{10}$$

$$\sin \left(\frac{13\pi}{8} + \alpha \right) = \sin \left(\frac{5\pi}{8} + \alpha \right) = \sin \left(\frac{5\pi}{8} \right) \cos \alpha + \sin \alpha \cos \left(\frac{5\pi}{8} \right)$$

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

$$2 \sin^2 x + \cos^2 x = \frac{2}{3}$$

$$\rightarrow 2(1 - \cos^2 x) + \cos^2 x = \frac{2}{3}$$

$$\rightarrow 2 - 2 \cos^2 x + \cos^2 x = \frac{2}{3}$$

$$\rightarrow 2 - \cos^2 x = \frac{2}{3}$$

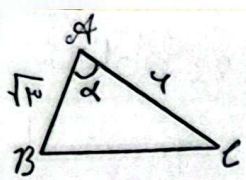
$$\rightarrow \cos^2 x = 2 - \frac{2}{3} = \frac{4}{3}$$

$$1 + \tan^2 x = \frac{1}{\frac{2}{3}}$$

$$\rightarrow 1 + \tan^2 x = \frac{3}{2}$$

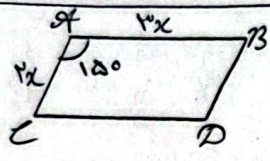
$$\rightarrow \tan^2 x = \frac{3}{2} - 1$$

$$\rightarrow \boxed{\tan^2 x = \frac{1}{2}}$$



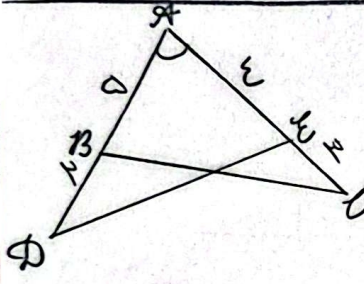
$$S_{ABC} = \frac{1}{2} \times 3 \times 4 \times \sin \alpha = \frac{1}{2} \times 5 \times \sin \alpha = \frac{9}{2} \rightarrow \sin \alpha = \frac{\frac{9}{2}}{\frac{15}{2}} = \frac{3}{5} \quad (9)$$

$$\sin \alpha = \frac{3}{5} \rightarrow 40^\circ \leq \alpha \leq 140^\circ \rightarrow \frac{140^\circ}{40^\circ} = \boxed{3}$$



$$S_{ABCD} = 3x \times 4x \times \sin(120^\circ) = 4x^2 \times \frac{\sqrt{3}}{2} = 2\sqrt{3}x^2 = \Delta \rightarrow x^2 = 1 \rightarrow x = 1$$

$$x = \sqrt{1} = 1 \rightarrow \frac{S_{ABCD}}{AB \times AD} = \frac{2\sqrt{3}}{3 \times 4} = \frac{\sqrt{3}}{6} = \frac{1}{2\sqrt{3}} \rightarrow \boxed{2\sqrt{3}}$$



$$S_{ABC} - S_{ADE} = \frac{1}{2} \Delta$$

$$\rightarrow \left(\frac{1}{2} \times 4 \times 3 \times \sin \hat{A} \right) - \left(\frac{1}{2} \times 2 \times 1.5 \times \sin \hat{A} \right) = \frac{1}{2} \Delta$$

$$\rightarrow \frac{6\Delta}{2} \sin \hat{A} - 1.5\Delta \sin \hat{A} = \frac{1}{2} \Delta$$

$$\rightarrow \frac{4.5}{2} \sin \hat{A} = \frac{1}{2} \Delta \rightarrow \sin \hat{A} = \frac{\frac{1}{2} \Delta}{\frac{4.5}{2}} = \frac{1}{9}$$

$$\rightarrow \cos \hat{A} = \frac{\sqrt{80}}{9}$$

$$\boxed{\tan \hat{A} = \frac{1}{\sqrt{80}} = \frac{\sqrt{10}}{40}}$$

$BN = \frac{1}{3} NC \rightarrow BN = \frac{1}{4} NC \rightarrow BN:NC = 1:3$

$$\frac{BN}{BC} = \frac{1}{4} \quad \frac{BM}{AB} = t \rightarrow \frac{AM}{AB} = 1-t \Rightarrow \frac{S_{BMN}}{S_{ABC}} = \frac{BM}{AB} \times \frac{BN}{BC} = t \times \frac{1}{4}$$

$$\frac{S_{BMN}}{S_{ABC}} = \frac{1}{10} \rightarrow \frac{1}{10} = \frac{1}{4} t \rightarrow t = \frac{4}{10} = \frac{2}{5} \rightarrow \frac{BM}{AM} = \frac{t}{1-t} = \frac{\frac{2}{5}}{\frac{3}{5}} = \frac{2}{3} = \boxed{2}$$

$$\frac{|\sin \alpha|}{\cos \alpha} = -\frac{1}{\cot \alpha} \rightarrow \frac{|\sin \alpha|}{\cos \alpha} = -\tan \alpha \quad (10)$$

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

$$\rightarrow \frac{|\sin \alpha|}{\cos \alpha} = \frac{\sin \alpha}{|\cos \alpha|} = -\tan \alpha$$

$$\boxed{\alpha \text{ در ناحیه سوم است}}$$

$$|\sin \alpha| \times |\cos \alpha| = \sin \alpha \times \cos \alpha = -\tan$$

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