

18. $\tan \frac{11\pi}{4} + \sin \frac{15\pi}{4} \cos \frac{13\pi}{4} = -1 + -\frac{\sqrt{2}}{2} \alpha - \frac{\sqrt{2}}{2} = -1 + \frac{1}{2} = \left(-\frac{1}{2}\right)$ A -1

5) $\tan \frac{17\pi}{6} \sin \frac{11\pi}{3} + \cos \frac{10\pi}{3} = -\frac{\sqrt{3}}{3} \alpha - \frac{\sqrt{3}}{2} - \frac{1}{2} = \frac{3}{6} - \frac{1}{2} = 0$ (2)

$\cot \alpha = 4 \Rightarrow \frac{\cos \alpha}{\sin \alpha} = \frac{4}{1} \Rightarrow \cos \alpha = 4, \sin \alpha = 1 \quad \frac{3 \times 4 - 1}{4 + 1} = \left(\frac{11}{5}\right)$ (2) -2

$\sin \alpha = 2 \cos \alpha \quad \Rightarrow \sin \alpha, \cos \alpha < 0 \quad \tan \alpha = \frac{\sin \alpha}{\cos \alpha} \Rightarrow \frac{2 \cos \alpha}{\cos \alpha} = 2$ (3) -3

$\tan^2 + 1 = \frac{1}{\cos^2} \Rightarrow 4 + 1 = \frac{1}{\cos^2} \Rightarrow \cos^2 = \frac{1}{5} \Rightarrow \cos = -\frac{1}{\sqrt{5}}$ (2)

$\cos\left(\frac{11\pi}{4} + \alpha\right) = \cos\left(\frac{3\pi}{4} + \alpha\right) \quad \sin^2 + \cos^2 = 1 \Rightarrow \frac{2}{100} + \cos^2 = 1 \Rightarrow \cos^2 = \frac{98}{100} \Rightarrow \cos = \frac{\sqrt{98}}{10} = \frac{7\sqrt{2}}{10}$
 $\sin \frac{3\pi}{4} = \frac{\sqrt{2}}{2}, \cos \frac{3\pi}{4} = -\frac{\sqrt{2}}{2} \quad \cos(\alpha + \beta) = (\cos \alpha \cdot \cos \beta) - (\sin \alpha \cdot \sin \beta) = \left(\frac{\sqrt{80}}{10} \cdot \frac{\sqrt{2}}{2}\right) - \left(\frac{12}{10} \cdot \frac{\sqrt{2}}{2}\right) \Rightarrow$
 $\frac{4\sqrt{10}}{20} - \frac{1}{10} = \frac{2\sqrt{10}}{10} - \frac{1}{10} = \frac{2\sqrt{10} - 1}{10}$

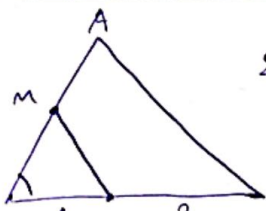
$\sin\left(\frac{13\pi}{4} + \alpha\right) = \sin\left(\frac{5\pi}{4} + \alpha\right) \quad 1 + \tan^2 \alpha = \frac{1}{\cos^2 \alpha} \Rightarrow 1 + \frac{1}{9} = \frac{1}{\cos^2 \alpha} \Rightarrow \cos^2 \alpha = \frac{9}{10} \Rightarrow \cos \alpha = \frac{3}{\sqrt{10}} \Rightarrow \sin \alpha = \frac{1}{\sqrt{10}}$
 $\sin \frac{5\pi}{4} = -\frac{\sqrt{2}}{2} \Rightarrow \cos \frac{5\pi}{4} = -\frac{\sqrt{2}}{2} \quad \sin(\alpha + \beta) = \sin \alpha \cos \beta + \sin \beta \cos \alpha = \left(\frac{1}{\sqrt{10}} \cdot \frac{\sqrt{2}}{2}\right) + \left(\frac{\sqrt{2}}{2} \cdot \frac{3}{\sqrt{10}}\right) \Rightarrow$
 $\frac{\sqrt{2}}{2\sqrt{10}} + \left(-\frac{3\sqrt{2}}{2\sqrt{10}}\right) = -\frac{2\sqrt{2}}{2\sqrt{10}} = -\frac{\sqrt{2}}{\sqrt{10}} = -\frac{1}{\sqrt{5}}$ (1)

$\sin^2 \alpha + \cos^2 \alpha = 1 \Rightarrow 2 \sin^2 \alpha + \cos^2 \alpha = \frac{4}{3} \Rightarrow \sin^2 \alpha = \frac{7}{3}, \cos^2 \alpha = \frac{2}{3}$
 $\tan^2 \alpha + 1 = \frac{1}{\cos^2 \alpha} \Rightarrow \tan^2 \alpha + 1 = \frac{3}{2} \Rightarrow \tan^2 \alpha = \frac{1}{2}$ (2) -5

$\frac{1}{2} \alpha \sin \alpha \cos \alpha = 4, 5 \Rightarrow 3\sqrt{3} \alpha \sin \alpha = 4, 5 \Rightarrow \sin \alpha = \frac{4,5}{3\sqrt{3}} = \frac{1,5}{\sqrt{3}} = \frac{1,5\sqrt{3}}{3} = \frac{\sqrt{3}}{2}$
 $\sin \alpha = \frac{\sqrt{3}}{2} \Rightarrow \alpha = \frac{\pi}{3} \Rightarrow \min \alpha = \frac{\pi}{3}, \max \alpha = \frac{2\pi}{3} \Rightarrow \frac{\max}{\min} = \frac{2\pi}{\pi} = 2$ (2)

$S = a \cdot b \cdot \sin \alpha = 54 \Rightarrow 2k \alpha 3k \alpha \sin 150 = 54 \Rightarrow 6k^2 \alpha \frac{1}{2} = 54 \Rightarrow 3k^2 = 54 \Rightarrow k^2 = 18 \Rightarrow k = 3\sqrt{2} \Rightarrow 2k = 6\sqrt{2}, 3k = 9\sqrt{2} \Rightarrow 2(6\sqrt{2} + 9\sqrt{2}) = 2(15\sqrt{2}) = 30\sqrt{2}$ (2)

$S_{ABC} - S_{ADE} = 1,75 \Rightarrow \left(\frac{1}{2} \alpha 5 \alpha 7 \alpha \sin \alpha\right) - \left(\frac{1}{2} \alpha 4 \alpha 7 \alpha \sin \alpha\right) = 1,75 \Rightarrow$
 $\frac{\sin \alpha (5 \alpha 7 - 4 \alpha 7)}{2} = 1,75 \Rightarrow \sin \alpha = \frac{1,75 \cdot 2}{7} = \frac{25}{50} = \frac{1}{2} \Rightarrow \alpha = 30 \Rightarrow \cos \alpha = \frac{\sqrt{3}}{2}$
 $\tan \alpha = \frac{\sin \alpha}{\cos \alpha} = \frac{\frac{1}{2}}{\frac{\sqrt{3}}{2}} = \frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3}$ (2)



$$2\overline{BN} = 3\overline{NC} \Rightarrow \overline{BN} = \frac{3}{2}\overline{NC} \Rightarrow 1 = \frac{3}{2} \times \left(\frac{2}{3}\right) \rightarrow \overline{NC} \rightarrow$$

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$$S_{ABC} = 3(S_{BAM}) \Rightarrow \frac{1}{2} \times AB \times \sin B = 3 \left(\frac{1}{2} \times BM \times \sin B \right)$$

$$\Rightarrow BM + AM = \frac{2}{5} BM \Rightarrow \frac{BM + AM}{BM} = \frac{2}{5} \Rightarrow \frac{BM}{BM} + \frac{AM}{BM} = \frac{2}{5} \Rightarrow \frac{AM}{BM} = \frac{2}{5} - 1 = -\frac{3}{5}$$

$$\Rightarrow \frac{AM}{BM} = \frac{2}{5} \Rightarrow \frac{AM}{5} = \frac{2}{5} \Rightarrow AM = 2$$

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

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

$$\Rightarrow |\sin \alpha| = -\sin \alpha \Rightarrow \sin \alpha < 0 \Rightarrow \sin \alpha = -1 \Rightarrow \alpha = \frac{3\pi}{2}$$

$$\Rightarrow \tan \alpha = \frac{\sin \alpha + 1}{|\cos \alpha|} = 0 \Rightarrow \tan \alpha = \frac{\sin \alpha}{|\cos \alpha|} \Rightarrow \frac{\sin \alpha}{\cos \alpha} = \frac{\sin \alpha}{|\cos \alpha|} \Rightarrow -\cos \alpha = |\cos \alpha| \Rightarrow \cos \alpha < 0$$

$$\Rightarrow \sin \alpha, \cos \alpha \neq 0 \Rightarrow \cot \alpha, \tan \alpha \neq 0 \Rightarrow \sin \alpha, \cos \alpha < 0 \Rightarrow \alpha = \frac{3\pi}{2}$$

$$\text{ربع دوم (الف)} \quad \begin{cases} \sin \alpha > 0 \\ \cos \alpha < 0 \end{cases} \rightarrow \cos^2 \alpha = 1 - \sin^2 \alpha \rightarrow \cos^2 \alpha = 1 - \left(\frac{\sqrt{2}}{2}\right)^2 = \frac{1}{2} \Rightarrow \cos \alpha = \pm \frac{1}{\sqrt{2}}$$

$$\sqrt{\cos^2 \alpha} = |\cos \alpha| \Rightarrow \frac{\sqrt{2}}{2} = \frac{1}{\sqrt{2}} \Rightarrow \cos \alpha = \frac{1}{\sqrt{2}}$$

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

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

$$-\cos\left(\alpha - \frac{\pi}{4}\right) = -\left(\cos \alpha \cos \frac{\pi}{4} + \sin \alpha \sin \frac{\pi}{4}\right) = -\left(\frac{\sqrt{2}}{2} \cos \alpha + \frac{\sqrt{2}}{2} \sin \alpha\right) =$$

$$-\frac{\sqrt{2}}{2} \left(-\frac{\sqrt{2}}{2} + \frac{\sqrt{2}}{2}\right) = -\frac{\sqrt{2}}{2} \times \frac{-\sqrt{2}}{2} - \frac{1}{2} = \frac{1}{2} - \frac{1}{2} = 0$$