

$$a) \tan \frac{11\pi}{2} + \sin \frac{10\pi}{2} \cos \frac{13\pi}{2} = -1 + \left(-\frac{\sqrt{3}}{2} \times \left(-\frac{\sqrt{3}}{2}\right)\right) = -1 + \frac{1}{2} = -\frac{1}{2}$$

$$b) \tan \frac{14\pi}{9} \sin \frac{11\pi}{9} + \cos \frac{10\pi}{9} = \left(-\frac{\sqrt{3}}{2} \times -\frac{\sqrt{3}}{2}\right) - \frac{1}{2} = \frac{1}{2} - \frac{1}{2} = 0$$

$$\cot \alpha = 2 \Rightarrow \frac{\cos \alpha}{\sin \alpha} = 2 \Rightarrow \cos \alpha = 2 \sin \alpha$$

$$2) \frac{2 \cos \alpha - \sin \alpha}{\cos \alpha + \sin \alpha} = \frac{12 \sin \alpha - \sin \alpha}{2 \sin \alpha + \sin \alpha} = \frac{11 \sin \alpha}{3 \sin \alpha} = \frac{11}{3}$$

$$\sin \alpha = 2 \cos \alpha, \quad \Rightarrow \sin \alpha > \cos \alpha < 0 \Rightarrow \tan \alpha = 2$$

$$\tan^2 \alpha + 1 = \frac{1}{\cos^2 \alpha} \Rightarrow 4 + 1 = \frac{1}{\cos^2 \alpha} \Rightarrow \cos^2 \alpha = \frac{1}{5} \Rightarrow \cos \alpha = \pm \frac{1}{\sqrt{5}}$$

نمونه جواب: $\cos \alpha = -\frac{1}{\sqrt{5}}$

$$\cos \left(\frac{11\pi}{2} + \alpha\right) = \cos \left(\frac{7\pi}{2} + \alpha\right) \quad \sin \alpha + \cos \alpha = 1 \Rightarrow \frac{1}{\sqrt{2}} + \frac{1}{\sqrt{2}} = 1 \Rightarrow \cos \alpha = \frac{1}{\sqrt{2}} \Rightarrow \sin \alpha = \frac{\sqrt{2}}{2}$$

$$\sin \frac{5\pi}{2} = \frac{\sqrt{2}}{2}, \quad \cos \frac{5\pi}{2} = -\frac{\sqrt{2}}{2} \Rightarrow \cos(\alpha + \beta) = \cos \left(\frac{5\pi}{2} + \alpha\right) = (\cos \alpha \cos \frac{5\pi}{2}) - (\sin \alpha \sin \frac{5\pi}{2})$$

جواب پایین است

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

$$\sin \left(\frac{9\pi}{2} + \alpha\right) = \sin \alpha \cos \frac{9\pi}{2} + \cos \alpha \sin \frac{9\pi}{2} = \frac{\sqrt{2}}{2} + \left(-\frac{\sqrt{2}}{2}\right) = \frac{\sqrt{2}}{2} - \frac{\sqrt{2}}{2} = 0$$

$$\sin^2 \alpha + \cos^2 \alpha = 1, \quad 2 \sin^2 \alpha + \cos^2 \alpha = \frac{5}{3} \Rightarrow \sin^2 \alpha = \frac{1}{3}, \quad \cos^2 \alpha = \frac{2}{3}$$

$$\tan^2 \alpha + 1 = \frac{1}{\cos^2 \alpha} \Rightarrow \tan^2 \alpha + 1 = \frac{3}{2} \Rightarrow \tan^2 \alpha = \frac{1}{2} \Rightarrow \tan \alpha = \pm \frac{1}{\sqrt{2}}$$

$$\frac{1}{r} \times \sqrt{r} \times 4 \times \sin \alpha = 1 \Rightarrow \sqrt{r} \sin \alpha = 1 \Rightarrow \sin \alpha = \frac{1}{\sqrt{r}}$$

$$\sin \alpha = \frac{\sqrt{5}}{7} \Rightarrow \alpha = \frac{\pi}{7} \Rightarrow \min \alpha = \frac{\pi}{7}, \max \alpha = \frac{5\pi}{7} \Rightarrow \frac{\max \alpha}{\min \alpha} = 5$$

در ضلع زاویه $\frac{\pi}{7}$ و $\frac{5\pi}{7}$

⑦

$S = a \cdot b \sin \alpha = 0.2 \Rightarrow 2K \times 2K \sin 10^\circ = 0.2 \Rightarrow 4K^2 \times \frac{1}{10} = 0.2 \Rightarrow 2K^2 = 0.2$
 $\Rightarrow K^2 = 0.1 \Rightarrow K = \sqrt{0.1} \Rightarrow 2K = 2\sqrt{0.1} \Rightarrow 2K = \sqrt{0.4} \Rightarrow \text{المساحة} = 4(a+b)$

$$P(9\sqrt{2} + 9\sqrt{2}) = 2\sqrt{2}$$

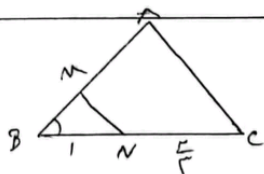
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$$S_{\Delta ADC} - S_{\Delta ADE} = 1, \forall \theta \Rightarrow \left(\frac{1}{r} \times 0 \times V \times \sin \alpha\right) - \left(\frac{1}{r} \times \alpha \times V \times \sin \alpha\right) = 1, \forall \theta$$

$$\Rightarrow \frac{\sin \alpha}{r} \cdot \cancel{(\cancel{r} + v - \cancel{r})} = 1 \quad \Rightarrow \sin \alpha = \frac{1}{r} \Rightarrow \alpha = r^{-1} \Rightarrow \cos \alpha = \frac{\sqrt{r^2 - 1}}{r}$$

$$\tan \alpha = \frac{\sin \alpha}{\cos \alpha} = \frac{\frac{1}{\sqrt{r}}}{\frac{\sqrt{r}}{r}} = \frac{\sqrt{r}}{r}$$

④



$$\frac{1}{r} BN = \frac{1}{r} NC \Rightarrow BN = \frac{r}{1} NC$$

$$S_{\Delta ABC} = r(S_{\Delta BNM}) \Rightarrow \frac{1}{2} \times \frac{BC}{r} \times \sin \beta = r \left(\frac{1}{2} \times \frac{BM}{r} \times \sin \beta \right)$$

$$\Rightarrow AB \propto d = 9(BN \times BM) \Rightarrow KB = \frac{9(BN \times BM)}{d}$$

$$B_M + A_M = \frac{q}{\sigma} B_M \Rightarrow A_M = \frac{\epsilon}{\sigma} B_M \Rightarrow \frac{B_M}{A_M} = \frac{\sigma}{\epsilon} \quad \checkmark$$

④

$$\frac{|\sin \alpha|}{\cos \alpha} = -\tan \alpha \Rightarrow \frac{|\sin \alpha|}{\cos \alpha} = \frac{-\sin \alpha}{\cos \alpha} \Rightarrow |\sin \alpha| = -\sin \alpha \Rightarrow \sin \alpha \leq 0$$

یعنی α در $[\pi, 2\pi]$ قرار می‌گیرد

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

C. $\log_2 10 < 0$  $\log 2$

⑤

الف) ربع دوم $\begin{cases} \sin \alpha > 0 \\ \cos \alpha < 0 \end{cases} \rightarrow \cos^2 \alpha = 1 - \sin^2 \alpha \rightarrow \cos^2 \alpha = 1 - \left(\frac{\sqrt{2}}{1}\right)^2 = \frac{9}{100}$ (سؤال 1)

$$\sqrt{} \rightarrow \cos \alpha = \pm \frac{\sqrt{9}}{10} \xrightarrow{\cos \alpha < 0} -\frac{\sqrt{9}}{10} = -\frac{3}{10}$$

$$\cos\left(\frac{11\pi}{6} + \alpha\right) \rightarrow \cos\left(\frac{11\pi}{6} - \frac{\pi}{6} + \alpha\right) = \cos\left(\frac{10\pi}{6} + \left(\alpha - \frac{\pi}{6}\right)\right) = -\cos\left(\alpha - \frac{\pi}{6}\right)$$

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

$$-\cos\left(\alpha - \frac{\pi}{6}\right) = -\left(\cos \alpha \cos \frac{\pi}{6} + \sin \alpha \sin \frac{\pi}{6}\right) = -\left(\frac{\sqrt{2}}{2} \cos \alpha + \frac{\sqrt{2}}{2} \sin \alpha\right) =$$

$$-\frac{\sqrt{2}}{2} \left(-\frac{3}{10} + \frac{\sqrt{2}}{10}\right) = -\frac{\sqrt{2}}{2} \times -\frac{3\sqrt{2}}{10} - \frac{1}{10} = \frac{3}{10} - \frac{1}{10} = \frac{2}{10} = \frac{1}{5}$$