

$$\text{الف) } \tan^{-1} \frac{1}{\sqrt{3}} + \sin^{-1} \frac{\sqrt{3}}{2} + \cos^{-1} \frac{\sqrt{3}}{2} = -1 + \frac{1}{2} = -\frac{1}{2} \checkmark$$

$$\text{ب) } \tan^{-1} \frac{1}{\sqrt{3}} + \sin^{-1} \frac{\sqrt{3}}{2} + \cos^{-1} \frac{\sqrt{3}}{2} = \frac{1}{2} + \frac{1}{2} = 1 \checkmark$$

$$\cot^2 n = 16 \rightarrow 1 + 16 = \frac{1}{\sin^2 n} \Rightarrow \sin n = \frac{1}{\sqrt{17}} \text{ و } \cos n = \frac{4}{\sqrt{17}}$$

$$\rightarrow \frac{\frac{12}{\sqrt{17}} - \frac{1}{\sqrt{17}}}{\frac{4}{\sqrt{17}} + \frac{1}{\sqrt{17}}} = \frac{\frac{11}{\sqrt{17}}}{\frac{5}{\sqrt{17}}} = \boxed{\frac{11}{5}} \checkmark$$

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

$$\rightarrow \cos a = -\frac{1}{\sqrt{5}} = -\frac{\sqrt{5}}{5} \checkmark$$

جواب پانزدهم

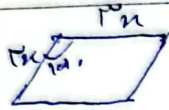
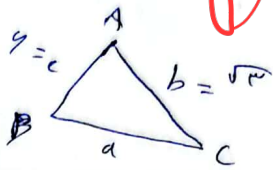
$$1 + \sin^2 n = \frac{5}{4} \Rightarrow \sin^2 n = \frac{1}{4} \Rightarrow \cos^2 n = \frac{3}{4}$$

$$\Rightarrow \tan^2 n = \frac{\sin^2 n}{\cos^2 n} = \frac{\frac{1}{4}}{\frac{3}{4}} = \boxed{\frac{1}{3}} \checkmark$$

$$\frac{1}{r} \times \sqrt{r} \times \sqrt{r} \sin \alpha = r \sin \alpha \Rightarrow \sin \alpha = \frac{r \sin \alpha}{\frac{r}{\sqrt{r}}} = \frac{r \sin \alpha}{\sqrt{r}} = \frac{r \sin \alpha \sqrt{r}}{r} = \frac{\sqrt{r}}{r} \Rightarrow \alpha = 45^\circ$$

$$\frac{r_0}{r} = 1 \quad \checkmark$$

$$\frac{a}{\frac{\sqrt{r}}{r}} = \frac{\sqrt{r}}{\sin B} \Rightarrow \frac{a}{\sqrt{r}} = \frac{\sqrt{r}}{\sin B} \Rightarrow a \sin B = r \Rightarrow a \sin B = 1 \Rightarrow \alpha = 45^\circ$$

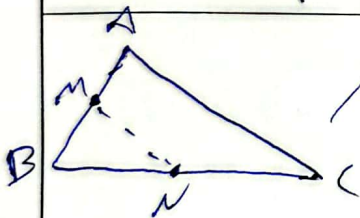


$$\rightarrow \frac{r}{n} \times \frac{n}{r} = \frac{1}{r} = \frac{n}{r} \Rightarrow n = r \Rightarrow \alpha = 45^\circ$$

$$\Rightarrow r(\sqrt{r}) + r(\sqrt{r}) = 1 \cdot \sqrt{r} = r \sqrt{r} = \text{مساحة}$$

$$\left. \begin{aligned} \frac{1}{r} \times V \times r \sin \alpha &= 1 \sin \alpha \\ \frac{1}{r} \times V \times d \sin \alpha &= 1 \sin \alpha \end{aligned} \right\} \Rightarrow \sin \alpha = \frac{1 \cdot V d}{r \cdot V} = \frac{1}{r} \Rightarrow \alpha = 30^\circ$$

$$\left. \begin{aligned} \sin 30^\circ &= \frac{1}{2} \\ \cos 30^\circ &= \frac{\sqrt{3}}{2} \end{aligned} \right\} \tan 30^\circ = \frac{\sin 30^\circ}{\cos 30^\circ} = \frac{\frac{1}{2}}{\frac{\sqrt{3}}{2}} = \frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3} \quad \checkmark$$



$$\frac{1}{r} \times AB \times \frac{BC}{r} \times \sin B = \frac{1}{r} \times \frac{BM}{r} \times \frac{BN}{r} \times \sin B$$

$$\Rightarrow \frac{a}{r} AB = \frac{1}{r} BM \Rightarrow \frac{BM}{AB} = \frac{a}{r}$$

$$\rightarrow AM = \frac{r}{a} BM \Rightarrow \frac{BM}{AM} = \frac{a}{r} \quad \checkmark$$

$$\frac{1 + \sin \alpha}{1 + \cos \alpha} \Rightarrow \text{مشتق} \quad \boxed{r = \frac{1}{\cos \alpha}} \quad \begin{cases} < \cos \alpha \\ > \sin \alpha \end{cases}$$

$$\frac{1 - \sin \alpha}{\cos \alpha} = \frac{1 + \sin \alpha}{1 + \cos \alpha} \Rightarrow \cos \alpha = \frac{1 + \sin \alpha}{1 - \sin \alpha} \Rightarrow \frac{1}{\cot \alpha} = \frac{1 + \sin \alpha}{1 - \sin \alpha} \Rightarrow \cot \alpha = \frac{1 - \sin \alpha}{1 + \sin \alpha}$$

الف) ربع دوم $\begin{cases} \sin \alpha > 0 \\ \cos \alpha < 0 \end{cases} \rightarrow \cos^2 \alpha = 1 - \sin^2 \alpha \rightarrow \cos^2 \alpha = 1 - \left(\frac{\sqrt{2}}{10}\right)^2 = \frac{98}{100}$ (سوال 9)

$$\sqrt{} \rightarrow \cos \alpha = \pm \frac{\sqrt{98}}{10} \xrightarrow{\cos \alpha < 0} -\frac{\sqrt{98}}{10} = \frac{-\sqrt{2}}{10}$$

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

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

$$-\cos\left(\alpha - \frac{\pi}{4}\right) = -\left(\cos \alpha \cos \frac{\pi}{4} + \sin \alpha \sin \frac{\pi}{4}\right) = -\left(\frac{\sqrt{2}}{10} \cos \alpha + \frac{\sqrt{2}}{10} \sin \alpha\right) =$$

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

ب) $1 + \tan^2 \alpha = \frac{1}{\cos^2 \alpha} \rightarrow 1 + \frac{1}{49} = \frac{1}{\cos^2 \alpha} \rightarrow \cos^2 \alpha = \frac{49}{50} \xrightarrow{\cos \alpha > 0} \cos \alpha = \frac{7\sqrt{2}}{10}$

$$\sin^2 \alpha = 1 - \cos^2 \alpha \rightarrow \sin^2 \alpha = 1 - \frac{49}{50} = \frac{1}{50} \rightarrow \sin^2 \alpha = \frac{1}{50} \xrightarrow{\sin \alpha > 0} \sin \alpha = \frac{\sqrt{2}}{10}$$

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

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

$$-\sin\left(\frac{\pi}{4} + \alpha\right) = -\left(\sin \frac{\pi}{4} \cos \alpha + \cos \frac{\pi}{4} \sin \alpha\right) = -\frac{\sqrt{2}}{10} (\cos \alpha + \sin \alpha) =$$

$$-\frac{\sqrt{2}}{10} \left(\frac{7\sqrt{2}}{10} + \frac{\sqrt{2}}{10}\right) = -\frac{8}{10} = -\frac{4}{5}$$

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

$$\frac{1}{|\cos \alpha|} - \frac{1 + \sin \alpha}{|\cos \alpha|} = \frac{\sin \alpha}{\cos \alpha} \rightarrow \frac{-\sin \alpha}{|\cos \alpha|} = \frac{\sin \alpha}{\cos \alpha} \rightarrow \cos \alpha < 0 \quad (I)$$

(سوال 10)

مجموعه سوال