

$$\begin{aligned} \text{الف) } \tan\left(\frac{\pi}{4} + \frac{\pi}{4}\right) &= \tan\left(\frac{\pi}{2}\right) \\ \sin\left(\frac{\pi}{4} + \frac{\pi}{4}\right) &= \sin\left(\frac{\pi}{2}\right) \\ \cos\left(\frac{\pi}{4} + \frac{\pi}{4}\right) &= \cos\left(\frac{\pi}{2}\right) \end{aligned} \quad (1)$$

$$\underbrace{\tan\left(\frac{\pi}{4}\right)}_{-1} + \underbrace{\sin\left(\frac{\pi}{4}\right)}_{\left(\frac{\sqrt{2}}{2}\right)} \underbrace{\cos\left(\frac{\pi}{4}\right)}_{\left(-\frac{\sqrt{2}}{2}\right)} = \boxed{-\frac{1}{2}}$$

$$\begin{aligned} \text{ب) } \tan\left(\frac{12\pi}{4} + \frac{0\pi}{4}\right) &= \tan\left(\frac{0\pi}{4}\right) \\ \sin\left(\frac{12\pi}{4} + \frac{0\pi}{4}\right) &= \sin\left(\frac{0\pi}{4}\right) \\ \cos\left(\frac{12\pi}{4} + \frac{0\pi}{4}\right) &= \cos\left(\frac{0\pi}{4}\right) \end{aligned}$$

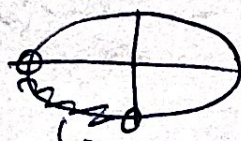
$$\underbrace{\tan\left(\frac{0\pi}{4}\right)}_{-1} \underbrace{\sin\left(\frac{0\pi}{4}\right)}_{\left(-\frac{\sqrt{2}}{2}\right)} + \underbrace{\cos\left(\frac{0\pi}{4}\right)}_{\left(-\frac{\sqrt{2}}{2}\right)} = \boxed{0}$$

$$\cot \alpha = 5 \rightarrow \frac{\cos \alpha}{\sin \alpha} = 5 \rightarrow \cos \alpha = 5 \sin \alpha \quad (2)$$

$$\frac{5 \sin \alpha - \sin \alpha}{5 \sin \alpha + \sin \alpha} = \frac{4 \sin \alpha}{6 \sin \alpha} = \boxed{\frac{2}{3}}$$

$$\sin \alpha = r \cos \alpha$$

$$\cos \alpha = \boxed{\frac{1}{\sqrt{2}}}$$



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

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

$$1 - \cos^2 \alpha + \cos^2 \alpha = 1$$

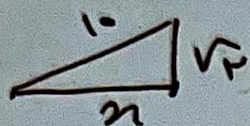
$$\cos^2 \alpha = 1 \rightarrow \cos \alpha = \pm 1 \rightarrow \cos \alpha = -\frac{1}{\sqrt{2}}$$

(3)

(4)

$$\cos(\alpha + \beta) = \cos \alpha \cos \beta - \sin \alpha \sin \beta \quad \text{از این نظم}$$

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

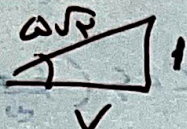


$x = \sqrt{2} \Rightarrow \cos \alpha = \frac{\sqrt{2}}{2}$ در مثل قائم الزامی است

$$\sin(\alpha + \beta) = \sin \alpha \cos \beta + \sin \beta \cos \alpha \quad \text{از این نظم}$$

$\therefore \sin\left(\frac{\sqrt{2}}{2} + \alpha\right) = \sin\left(\frac{\sqrt{2}}{2}\right) \cos(\alpha) + \sin(\alpha) \cos\left(\frac{\sqrt{2}}{2}\right) = \boxed{\frac{\sqrt{2}}{2}}$

$\tan \alpha = \frac{\text{مقابل}}{\text{جانب}}$



$\cos \alpha = \frac{1}{\sqrt{2}}$

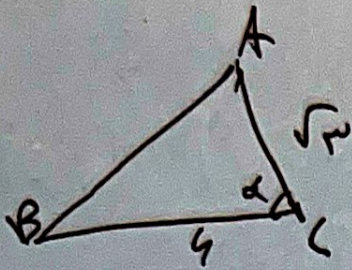
$\sin \alpha = \frac{\sqrt{2}}{2}$

$$\sin^2 \alpha + \cos^2 \alpha = \frac{2}{2}$$

(5)

$\tan^2 \alpha = ? \rightarrow \frac{\sin^2 \alpha}{\cos^2 \alpha} = ? \rightarrow \frac{1/2}{1/2} = \boxed{1}$

$\left. \begin{array}{l} \sin^2 \alpha + \cos^2 \alpha = \frac{2}{2} \\ \sin^2 \alpha + \cos^2 \alpha = 1 \end{array} \right\} \rightarrow \sin^2 \alpha = \frac{1}{2} \rightarrow \sin \alpha = \frac{1}{\sqrt{2}} \rightarrow \cos^2 \alpha = \frac{1}{2} \rightarrow \cos \alpha = \frac{1}{\sqrt{2}}$



$$\frac{1}{\sqrt{2}} \times \sqrt{2} \times \sin \alpha = \frac{1}{2} \Rightarrow \sin \alpha = \frac{1}{2}$$

$$\sqrt{2} \times \sin \alpha = \frac{1}{2}$$

$$\Rightarrow \sin \alpha = \frac{1}{2\sqrt{2}} = \frac{1}{2\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}} = \frac{1}{2\sqrt{2} \times \sqrt{2}} = \frac{1}{2 \times 2} = \frac{1}{4}$$

(max) 1/2 $\leftarrow \alpha$
(min) 1/4

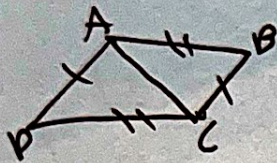
$$\frac{1/2}{1/4} = \frac{1}{2} \times \frac{4}{1} = 2$$

(6)

$$P(\triangle ABC) = \frac{1}{2} \times AB \times AC \times \sin \alpha$$

(7)

$$P_{ABC} = \omega \epsilon \rightarrow \frac{1}{2} \times n \times n \times \sin \alpha \rightarrow \frac{1}{2} \times n^2 \times \sin \alpha = \omega \epsilon$$



$$\frac{1}{2} n^2 \sin \alpha = \omega \epsilon \Rightarrow n^2 = \frac{2\omega \epsilon}{\sin \alpha}$$

$$n = 4\sqrt{2}$$

$$n = 4\sqrt{1}$$

$$P_{ABC} = (P_{PAB}) + (P_{PBC}) + (P_{PCA})$$

$$\left(\frac{1}{2} \times (4\sqrt{2}) \times (4\sqrt{2}) \times \sin \alpha \right) + \left(\frac{1}{2} \times (4\sqrt{2}) \times (4\sqrt{2}) \times \sin \alpha \right) + \left(\frac{1}{2} \times (4\sqrt{2}) \times (4\sqrt{2}) \times \sin \alpha \right) = 3 \times \frac{1}{2} \times (4\sqrt{2}) \times (4\sqrt{2}) \times \sin \alpha$$

$$P_{ABC} = \frac{1}{2} \times \sqrt{2} \times \sqrt{2} \times \sin \alpha \times \frac{1}{2} = \frac{1}{2} \sin \alpha$$

(8)

$$P_{ADE} = \frac{1}{2} \times \sqrt{2} \times \sqrt{2} \times \sin \alpha = \frac{1}{2} \sin \alpha$$

$$\frac{1}{2} \sin \alpha = \frac{1}{2} \sin \alpha \Rightarrow \frac{1}{2} \sin \alpha = \frac{1}{2} \sin \alpha$$

$$\sin \alpha = \frac{1}{2} \rightarrow \text{triangle with hypotenuse 2 and opposite side 1} \Rightarrow \alpha = 30^\circ$$

$$\sin \alpha = \frac{1}{2} \Rightarrow \alpha = 30^\circ$$

$$\tan \alpha = \frac{\sin \alpha}{\cos \alpha} = \frac{1/2}{\sqrt{3}/2} = \frac{1}{\sqrt{3}}$$

$$\frac{|\sin \alpha|}{\cos \alpha} = \frac{1}{\cos \alpha} \rightarrow \frac{|\sin \alpha|}{\cos \alpha} = \frac{1}{\cos \alpha} \Rightarrow |\sin \alpha| = 1$$

$$|\sin \alpha| = -\sin \alpha \Rightarrow \sin \alpha < 0$$

$$\frac{1}{\sqrt{\cos \alpha}} = \frac{1}{\cos \alpha} \Rightarrow \frac{1}{\sqrt{\cos \alpha}} = \frac{1}{\cos \alpha} \Rightarrow \sqrt{\cos \alpha} = \cos \alpha$$

$$|\cos \alpha| = \cos \alpha \Rightarrow \cos \alpha > 0$$

(10)