

$$\tan \frac{\pi}{4} = a \Rightarrow \frac{\pi}{4} \times \frac{180}{\pi} = 45^\circ \Rightarrow \boxed{45^\circ} = a$$

$$\tan 45^\circ = \frac{1}{a}, \tan 135^\circ = -\frac{1}{a} \quad (V)$$

$$\tan 140^\circ = -a, \tan 10^\circ = \cot 40^\circ = \frac{1}{a}$$

$$A = \frac{\tan 45^\circ + \tan 135^\circ}{\tan 140^\circ - \tan 10^\circ} = \frac{\tan(45^\circ - a) + \tan(45^\circ + a)}{\tan(140^\circ - a) - \tan(40^\circ - a)} = \frac{\left(\frac{1}{\tan a}\right) - \frac{1}{\tan a}}{(-\tan a) - \cot a}$$

$$A = \frac{\frac{1}{a} + \left(-\frac{1}{a}\right)}{-\tan a - \cot a} = \frac{\frac{1}{a}}{-\tan a - \frac{1}{\tan a}} \xrightarrow{\text{مخرج مشترک}} \frac{1}{-\tan^2 a - 1} = \boxed{-\frac{1}{\tan^2 a + 1}}$$

$$\frac{\sin x + \cos x}{\sin x - \cos x} + \frac{\sin x - \cos x}{\sin x + \cos x} = r$$

$$\tan^2 x = ? \Rightarrow 1 + \tan^2 x = \frac{1}{\cos^2 x} \Rightarrow \tan^2 x = \frac{1}{\cos^2 x} - 1$$

$$\frac{(\sin x + \cos x)^2 + (\sin x - \cos x)^2}{(\sin x - \cos x)(\sin x + \cos x)} \Rightarrow \frac{\sin^2 x + \cos^2 x + 2\sin x \cos x + \sin^2 x + \cos^2 x - 2\cos x \sin x}{\sin^2 x - \cos^2 x}$$

$$\frac{2}{\sin^2 x - \cos^2 x} = r \Rightarrow 2(\sin^2 x - \cos^2 x) = r \Rightarrow \sin^2 x - \cos^2 x = \frac{r}{2} \Rightarrow 1 - \cos^2 x - \cos^2 x = \frac{r}{2}$$

$$-2\cos^2 x = -\frac{1}{r} \Rightarrow \cos^2 x = \frac{1}{2r} \Rightarrow \frac{1}{\cos^2 x} = 2r \Rightarrow \tan^2 x = 2r - 1 \Rightarrow \boxed{\tan^2 x = 2r - 1}$$

$$\frac{\sin^2 x - 2\cos^2 x + 1}{\sin^2 x + 2\cos^2 x - 1} = r$$

$$\tan^2 x = ?$$

$$\sin^2 x = 1 - \cos^2 x$$

$$\Rightarrow \sin^2 x - 2\cos^2 x + 1 = (1 - \cos^2 x) - 2\cos^2 x + 1 = 2 - 3\cos^2 x$$

$$\omega = 2\sin^2 x + 1\cos^2 x \Rightarrow \omega = 2(1 - \cos^2 x) + 1\cos^2 x \Rightarrow 2\cos^2 x = 2 \Rightarrow \cos^2 x = 1 \Rightarrow \frac{1}{\cos^2 x} = 1$$

$$\tan^2 x = \frac{1}{\cos^2 x} - 1 \Rightarrow \tan^2 x = 1 - 1 \Rightarrow \boxed{\tan^2 x = 0}$$

$$(A) \cos(45^\circ) \quad \cos^2(45^\circ) = \frac{1 + \cos^2(90^\circ)}{2} \Rightarrow \frac{1 + 0}{2} = \frac{1}{2} \Rightarrow \boxed{\frac{1}{2}}$$

$$(B) \sin(45^\circ) \quad \sin^2(45^\circ) = \frac{1 - \cos^2(90^\circ)}{2} \Rightarrow \frac{1 - 0}{2} = \frac{1}{2} \Rightarrow \boxed{\frac{1}{2}}$$



$$4 \times 30^\circ = 120^\circ$$

$$4 \times 4 = 16^\circ$$

$$\frac{16}{4} = 4 \Rightarrow 3 - 4 = -1$$

$$\left. \begin{aligned} 120^\circ + 16^\circ + 4^\circ &= 140^\circ \\ 140^\circ - 120^\circ &= 20^\circ \end{aligned} \right\} \text{جواب } 140^\circ$$

$$\alpha = |\omega_1 \omega_2 M - \omega_0 H| \Rightarrow |\omega_1 \omega_2 \times \omega_4 - \omega_0 \times \omega_3| = 140^\circ \Rightarrow 140^\circ - 120^\circ = 20^\circ$$



$\Rightarrow$

$$3 \times 2 = 6^\circ$$

$$\frac{16}{2} = 8 \Rightarrow 3 - 8 = -5$$

$$\left. \begin{aligned} 40^\circ + 21^\circ &= 61^\circ \end{aligned} \right\}$$

(الف 2)

$$\alpha = |\omega_1 \omega_2 M - \omega_0 H| \Rightarrow |\omega_1 \omega_2 \times 16 - \omega_0 \times 4| \Rightarrow |99 - 120| = 21^\circ$$

$$\alpha = \frac{\pi}{4}, R = 3 \text{ cm}$$

$$S_{\text{قطاع OAB}} = \frac{\alpha}{2} R^2 \Rightarrow \frac{\pi}{4} \times 3^2 \Rightarrow \frac{\pi}{4} \times 9 = \frac{9\pi}{4}$$

$$S_{\text{OAB}} = 2R + L \Rightarrow 2R + \alpha R \Rightarrow 2 \times 3 + \frac{\pi}{4} \times 3 = 6 + \frac{3\pi}{4}$$



$$S_{ABC} = \frac{1}{2} \times 1 \times 2 \times \sin 40^\circ \Rightarrow \frac{1}{2} \times 2 \times \sin 40^\circ \Rightarrow \sin 40^\circ$$

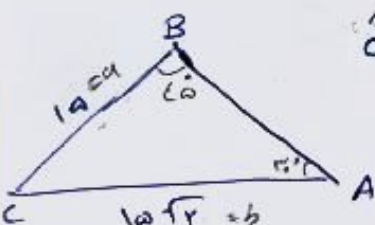
$$BC^2 = 1^2 + 2^2 - 2 \times 1 \times 2 \times \cos 40^\circ \Rightarrow 1 + 4 - 4 \cos 40^\circ \Rightarrow 5 - 4 \cos 40^\circ$$

$$P_{ABC} = \frac{1}{2} \times 1 \times 2 \times \sin 40^\circ \Rightarrow 1 \times \sin 40^\circ \Rightarrow \sin 40^\circ$$

$$BC = \sqrt{5 - 4 \cos 40^\circ} \Rightarrow BC \approx 1.9$$

(الف 3)

(ب)



$$\hat{C} + \hat{B} = 180^\circ \Rightarrow \hat{A} = 180^\circ - 100^\circ = 80^\circ$$

$$\frac{a}{\sin A} = \frac{b}{\sin B} \Rightarrow \frac{1}{\sin 80^\circ} = \frac{2}{\sin B} \Rightarrow \sin B = 2 \sin 80^\circ$$

$$100^\circ - 40^\circ = 60^\circ \Rightarrow \hat{B} = 60^\circ$$

$$\hat{B} = 60^\circ \times \frac{\pi}{180} = \frac{\pi}{3}$$

$$\hat{C} = 40^\circ \times \frac{\pi}{180} = \frac{2\pi}{9}$$

(4)

$$\frac{\tan(\pi - \alpha) + r \tan(\pi + \alpha)}{\tan(r\pi - \alpha) - \tan(r\pi + \alpha)} = \frac{-\tan \alpha + r \tan \alpha}{-\tan \alpha - \tan \alpha} = \frac{r \tan \alpha}{-2 \tan \alpha} = -\frac{r}{2}$$