$x=0 \rightarrow \tan\left(0+\frac{\pi}{4}\right)=1 \Rightarrow B=(0,1)$

$y=\tan\left(-\frac{\pi}{4}x+\frac{\pi}{4}\right)=0 \Rightarrow -\frac{\pi}{4}x+\frac{\pi}{4}=k\pi \Rightarrow x=1-4k \Rightarrow A=(1,0)$

$S_{ABC}=\frac{1}{2}\times 1\times 1=\frac{1}{2}$

۱-

$x^2-\sin(\alpha)x-\frac{1}{4}(1-\sin^2\alpha)=0$

$\Delta=b^2-4ac=\sin^2\alpha-4\alpha\left(-\frac{1}{4}\alpha\left(1-\sin^2\alpha\right)\right)=\sin^2\alpha+1-\sin^2\alpha=1$

$\sin^2\alpha-4\alpha\left(-\frac{1}{4}\alpha\left(\cos^2\alpha\right)\right)=\sin^2\alpha+\cos^2\alpha=1$

$\frac{-b\pm\sqrt{\Delta}}{2a}=\frac{\sin\alpha\pm 1}{2}=\frac{1}{2}$ $\quad \sin\alpha+1=\frac{1}{2}\mp 1 \Rightarrow \sin\alpha=\frac{1}{2}$

۲-

$1+\tan^2\alpha=\frac{1}{\cos^2\alpha} \Rightarrow 1+\tan^2\alpha=\frac{9}{8}$

$\cos^2\alpha=1-\sin^2\alpha=1-\frac{1}{4}=\frac{3}{4}$

۳-

$\log\frac{\sin\alpha}{-\cos\alpha}=\log 2$ $\quad \sin\alpha=-2\cos\alpha \Rightarrow \sin^2\alpha=4\cos\alpha \Rightarrow 4\cos\alpha=1-\cos^2\alpha \Rightarrow \cos^2\alpha+4\cos\alpha-1=0$

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

$\Rightarrow \Delta=16-4\times(-1)=20 \Rightarrow -b\pm\sqrt{\Delta}=-4\pm\sqrt{20} \Rightarrow \cos\alpha=\frac{-4+\sqrt{20}}{2}$ $\quad \sin\alpha=-2\alpha\left(\frac{-4+\sqrt{20}}{2}\right)$

$-2\cos\alpha-\cos\alpha=-3\cos\alpha=-3\alpha\left(\frac{-4+\sqrt{20}}{2}\right)=12-6\sqrt{20}$

$\sin^4\theta+\cos^2\theta=\frac{4}{5}$ $\quad \sin^4\theta=1-\cos^4\theta \Rightarrow \cos^4\theta-\cos^2\theta-\frac{1}{5}=0$ ۴-

$\frac{-b\pm\sqrt{\Delta}}{2a}=\frac{1\pm\sqrt{1+\frac{4}{5}}}{2}=\frac{1\pm 3\sqrt{5}/5}{2}=\frac{5\pm 3\sqrt{5}}{10} \Rightarrow \cos^2\theta=\frac{5-3\sqrt{5}}{10}$

$\Rightarrow \cos^4\theta=\frac{5-3\sqrt{5}}{10}^{2}+\frac{2}{10}=\frac{7-3\sqrt{5}}{10}$ $\quad \sin^2\theta=1-\left(\frac{5-3\sqrt{5}}{10}\right)=\frac{5+3\sqrt{5}}{10} \Rightarrow \cos^4\theta+\sin^2\theta=\frac{12}{10}=1/2$

$\frac{\sin x(3+\cos x)}{2(1-\cos^2 x)}=\frac{3+\cos x}{2\sin x}<0$ ۵-

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

$3\pm1 \Rightarrow$ همواره مثبت

$\Rightarrow \sin x<0$

در ربع سوم یا چهارم $\Rightarrow$

$\sin x \cdot \frac{\sin x}{\cos x}-\frac{1}{\cos x}>0 \Rightarrow \frac{-\cos^2 x}{\cos x}=-\cos x>0 \Rightarrow \cos x<0$

٧-

$$\frac{2}{\sin\alpha} = -\frac{2}{\cos\alpha} \Rightarrow \cancel{2\cos\alpha = -2\sin\alpha} \qquad \frac{\cos\alpha}{\sin\alpha} = \cot\alpha = -\frac{2}{2} \Rightarrow \tan\alpha + \cot\alpha = -\frac{2}{2} - \frac{2}{2} = -\frac{9-4}{6} = -\frac{13}{6}$$

٨-

$$\sin\theta_0 = \cos 5^\circ = \cos 2\alpha 2.5^\circ = \cos^2 2.5^\circ - \sin^2 2.5^\circ \Rightarrow \sqrt{1+\cos^2 2.5^\circ - \sin^2 2.5^\circ} = \sqrt{2}\cos 2.5^\circ$$

$$\sin A + \sin B = 2\sin\frac{\alpha+\beta}{2}\cos\frac{\alpha-\beta}{2} \Rightarrow 2\sin 2.5^\circ \cos 2.5^\circ = \cos 2.5^\circ \Rightarrow \sqrt{2}\cos 2.5^\circ = \sqrt{2}$$

$$1 - 2\sin^2\theta^\circ = \sin^2\theta^\circ + \cos^2\theta^\circ - 2\sin^2\theta^\circ = \cos^2\theta^\circ - \sin^2\theta^\circ = \cos 1^\circ \rightarrow \sqrt{1-\sin^2 1^\circ}$$

٩-

$$\frac{1-\tan^2 2.5^\circ}{1+\tan^2 2.5^\circ} = \cos 5^\circ = \cos^2 2.5^\circ - \sin^2 2.5^\circ \rightarrow 2\sin 2.5^\circ \cos 2.5^\circ = \cos^2 2.5^\circ + \sin^2 2.5^\circ$$

$$\left(\cos 2.5^\circ - \sin 2.5^\circ\right)^2 = \cos^2 2.5^\circ + \sin^2 2.5^\circ - 2\sin 2.5^\circ \cos 2.5^\circ \qquad \rightarrow \left(1-\sin^2 2.5^\circ\right)^2 = 2\sin^2 2.5^\circ + 1 - 2\sin^2 2.5^\circ$$

$$2\cos^2 2.5^\circ - 1 = \cos^2 2.5^\circ + \cos^2 2.5^\circ - 1$$

$$\rightarrow 2 - \sin^2 2.5^\circ = 1 - \sin^2 2.5^\circ - \sin^2 2.5^\circ$$

$$\Rightarrow \left(2\cos^2 2.5^\circ - \cos 2.5^\circ\right)\left(\cos^2 2.5^\circ + \sin^2 2.5^\circ\right) =$$

$$\Rightarrow \left(1-\sin^2 2.5^\circ\right)\left(\sqrt{1-\sin^2 2.5^\circ}\right)\left(2\sin^2 2.5^\circ + 1 - 2\sin^2 2.5^\circ\right)$$

٦-

١٠-

$$\sin B \sin C = \cos^2\frac{A}{2} \qquad \sin C = \cos 15^\circ \xrightarrow{\text{in}} \cos^2 15^\circ = \cos^2\frac{A}{2} \Rightarrow A = 30^\circ$$

$$\rightarrow \cos 15^\circ \qquad \rightarrow 15 + 75 + \frac{A}{2} = 90^\circ$$

$$15^\circ - 75 = 15$$

$$15/2 = 7.5$$