



$$y = \tan(-2x + \frac{\pi}{4}) \xrightarrow{x=0} y = \tan \frac{\pi}{4} = 1$$

$$\left. \begin{aligned} A: -2x + \frac{\pi}{4} = \frac{\pi}{4} &\Rightarrow x = -\frac{\pi}{8} \\ B: -2x + \frac{\pi}{4} = -\frac{\pi}{4} &\Rightarrow x = \frac{3\pi}{8} \end{aligned} \right\} \Rightarrow C - A = \frac{\pi}{2}$$

$$\Rightarrow S_{ABC} = \frac{1}{2} \times 1 \times \frac{\pi}{2} = \frac{\pi}{4}$$

سوال (۱)

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

سوال (۲)

$$\frac{1}{4} \sin^2 \alpha - \frac{1}{2} \sin \alpha + \frac{1}{4} = 0 \xrightarrow{\times 4} \sin^2 \alpha - 2 \sin \alpha + 1 = 0 \rightarrow (\sin \alpha - 1)(\sin \alpha - 1) = 0 \rightarrow \sin \alpha = 1 \vee \sin \alpha = 0$$

$$\sin^2 \alpha = \frac{1}{4} \rightarrow \cos^2 \alpha = 1 - \frac{1}{4} = \frac{3}{4} \rightarrow 1 + \tan^2 \alpha = \frac{1}{\cos^2 \alpha} = \frac{4}{3} \Rightarrow \tan^2 \alpha = \frac{1}{3}$$

$$\log(\sin \alpha) - \log(-\cos \alpha) = \log 3 \rightarrow \log\left(\frac{\sin \alpha}{-\cos \alpha}\right) = \log 3 \rightarrow \log(-\tan \alpha) = \log 3 \rightarrow \tan \alpha = -3$$



سوال (۳)

از اینجا می‌دانیم $\tan \alpha$ است پس یا $\cos \alpha = 0$ یا $\sin \alpha = 0$ از اینجا می‌دانیم که برای هر دو صورت سوال $\cos \alpha$ را می‌توانیم به دست آوریم پس می‌توانیم به دست آوریم $\cos \alpha$ و $\sin \alpha$ را.

$$\rightarrow \sin \alpha = \frac{3}{\sqrt{10}} = \frac{3\sqrt{10}}{10}, \cos \alpha = \frac{-1}{\sqrt{10}} = \frac{-\sqrt{10}}{10} \Rightarrow \sin \alpha - \cos \alpha = \frac{3\sqrt{10}}{10} + \frac{\sqrt{10}}{10} = \frac{4\sqrt{10}}{10} = \frac{2\sqrt{10}}{5}$$

$$\sin^2 \theta + \cos^2 \theta = \frac{4}{9} \rightarrow \sin^2 \theta - \sin^2 \theta + 1 = \frac{4}{9} \rightarrow \sin^2 \theta (\sin^2 \theta - 1) = -\frac{1}{9} \Rightarrow \sin^2 \theta \cos^2 \theta = \frac{1}{9}$$

سوال (۴)

$$\cos^2 \theta + \sin^2 \theta - \cos^2 \theta - \cos^2 \theta + 1 = \cos^2 \theta (\cos^2 \theta - 1) + 1 = -\sin^2 \theta \cos^2 \theta + 1 = -\frac{1}{9} + 1 = \frac{8}{9}$$

$$\frac{3 \sin \theta + \sin \theta \cos \theta}{2 - 2 \cos^2 \theta} \rightarrow \frac{\sin \theta (3 + \cos \theta)}{2 - 2(1 - \sin^2 \theta)} \rightarrow \frac{\sin \theta (3 + \cos \theta)}{2 - 2 + 2 \sin^2 \theta} \rightarrow \frac{3 + \cos \theta}{2 \sin \theta} \rightarrow \sin \theta$$

سوال (۵)

نصیب دوم برابر است

$$\sin \theta \tan \theta = \frac{1}{\cos \theta} \rightarrow \frac{\sin^2 \theta}{\cos \theta} = \frac{1}{\cos \theta} \rightarrow \sin^2 \theta = 1 \rightarrow \cos^2 \theta = 0 \rightarrow \cos \theta = 0$$

$$\frac{2}{\sin \theta} + \frac{3}{\cos \theta} = 0 \Rightarrow \frac{2 \cos \theta + 3 \sin \theta}{\sin \theta \cos \theta} = 0 \rightarrow 2 \cos \theta = -3 \sin \theta \rightarrow \tan \theta = -\frac{2}{3}, \cot \theta = -\frac{3}{2}$$

سوال (۶)

$$\tan \theta + \cot \theta = -\frac{2}{3} - \frac{3}{2} = -\frac{4+9}{6} = -\frac{13}{6}$$

$$\frac{\sqrt{1 + \sin \theta}}{\sin \theta + \sin \theta} = \frac{\sqrt{1 + \cos \theta}}{\sin(\theta + \theta) + \sin(\theta - \theta)} = \frac{\sqrt{2 \cos^2 \theta}}{\sin \theta \cos \theta + \sin \theta \cos \theta + \sin \theta \cos \theta - \sin \theta \cos \theta} = \frac{\sqrt{2} \cos \theta}{2 \sin \theta \cos \theta} = \frac{\sqrt{2} \cos \theta}{2 \cos \theta} = \frac{\sqrt{2}}{2}$$

سوال (۷)

$$\frac{\cos \theta}{(1 - \sin^2 \theta)} \cdot \frac{\cos \theta}{(1 - \cos^2 \theta)} \cdot \frac{\cos \theta}{(1 - \tan^2 \theta)} = \frac{\sin \theta}{\sin \theta} \cdot \frac{\cos \theta}{\cos \theta} \cdot \frac{\cos \theta}{\cos \theta} \cdot \frac{1}{\sin \theta} = \frac{1}{\sin \theta} \cdot \frac{\sin \theta}{\sin \theta} = \frac{1}{\sin \theta} \cdot \frac{\cos \theta}{\sin \theta} = \frac{1}{\sin \theta} \cot \theta$$

سوال (۸)

$$\sin \alpha + 12 \cos \alpha = 13 \rightarrow \sin \alpha = 13 - 12 \cos \alpha \xrightarrow{2 \text{ طرف } \sin^2 \alpha} \sin^2 \alpha = 9 \cos^2 \alpha - 24 \cos \alpha + 13 \xrightarrow{\sin^2 \alpha = 1 - \cos^2 \alpha} \text{سوال 9}$$

$$1 - \cos^2 \alpha - 12 \cos \alpha + 13 = 0 \Rightarrow 1 - \cos^2 \alpha - 12 \cos \alpha - 12 = -11$$

$$- \cos^2 \alpha - 12 \cos \alpha = -11 \Rightarrow (12 \cos \alpha - 1) - 12 \cos \alpha = -10 \cos^2 \alpha - 12 \cos \alpha - 11 = -11 \quad \leftarrow$$

$$\sin \hat{B} \sin \hat{C} = \cos \frac{A}{2} \xrightarrow{\cos \frac{A}{2} = \frac{1 + \cos A}{2}} 2 \sin \hat{B} \sin \hat{C} = 1 + \cos \hat{A} \quad \text{سوال 10}$$

$$\cos(\pi - (B+C)) = -\cos(B+C)$$

$$2 \sin B \sin C = 1 - \cos(B+C) \Rightarrow 2 \sin B \sin C = 1 - \cos B \cos C + \sin B \sin C \Rightarrow \cos B \cos C + \sin B \sin C = 1$$

$$\Rightarrow \cos(B-C) = 1 \Rightarrow B-C = 0 \Rightarrow B=C=12 \Rightarrow A = 180 - 2(12) = 156 \Rightarrow \hat{A} = 156^\circ$$