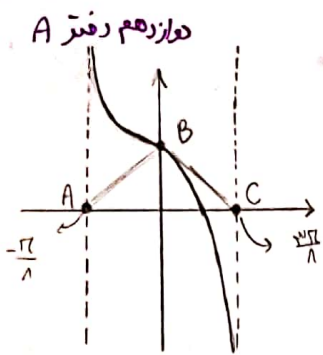


سوال (۱)



$$y = \tan(-2x + \frac{\pi}{2}) \rightarrow B: y = \tan(0 + \frac{\pi}{2}) = 1 \rightarrow B(1)$$

$$C: y = \tan(-2x + \frac{\pi}{2}) = -\infty \rightarrow -2x + \frac{\pi}{2} = -\frac{\pi}{2} \rightarrow 2x = \frac{3\pi}{2} \rightarrow x = \frac{3\pi}{4}$$

$$A: y = \tan(-2x + \frac{\pi}{2}) = +\infty \rightarrow -2x + \frac{\pi}{2} = \frac{\pi}{2} \rightarrow 2x = -\frac{\pi}{2} \rightarrow x = -\frac{\pi}{4}$$

$$\overline{AC} = \frac{3\pi}{4} - (-\frac{\pi}{4}) = \frac{4\pi}{4} = \pi$$

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

سوال (۲)

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

$$\frac{x}{q} - \frac{1}{x} \sin \alpha - \frac{1}{x} + \frac{\sin^2 \alpha}{x} = 0 \rightarrow \frac{1}{x} \sin^2 \alpha - \frac{1}{x} \sin \alpha + \frac{1}{x} = 0 \rightarrow \sin \alpha = \frac{\frac{1}{x} \pm \sqrt{\frac{1}{x^2} - \frac{4}{x}}}{\frac{1}{x}} = \frac{1 \pm \sqrt{1 - 4x}}{1}$$

$$\left\{ \begin{array}{l} \frac{\frac{1}{x} + 1}{1} = \frac{1}{x} \Rightarrow \frac{1}{x} = \frac{1}{x} \text{ (مطلوبه)} \\ \frac{\frac{1}{x} - 1}{1} = \frac{1}{x} \Rightarrow \frac{1}{x} = \frac{1}{x} \end{array} \right\} \rightarrow \sin \alpha = \frac{1}{x} \xrightarrow{\sin^2 \alpha + \cos^2 \alpha = 1} \frac{1}{x^2} + \cos^2 \alpha = 1 \rightarrow \cos^2 \alpha = \frac{1}{x^2}$$

$$1 + \tan^2 \alpha = \frac{1}{\cos^2 \alpha} = \frac{1}{\frac{1}{x^2}} = x^2$$

سوال (۳)

$$\log \sin \alpha - \log -\cos \alpha = \log 10 \rightarrow \log \sin \alpha + \log \frac{-1}{\cos \alpha} = \log 10 \rightarrow \log \frac{-\sin \alpha}{\cos \alpha} = \log 10$$

$$\frac{-\sin \alpha}{\cos \alpha} = 10 \rightarrow \frac{-\tan \alpha}{1} = 10 \rightarrow \tan \alpha = -10 \rightarrow \sin \alpha - \cos \alpha = \cos \alpha (\tan \alpha - 1) \rightarrow \frac{-\sqrt{10}}{10} (-10 - 1) = \frac{11\sqrt{10}}{10}$$

$$1 + \tan^2 \alpha = \frac{1}{\cos^2 \alpha} \rightarrow 1 + 100 = \frac{1}{\cos^2 \alpha} \rightarrow \cos^2 \alpha = \frac{1}{101} \rightarrow \cos \alpha = \pm \frac{1}{\sqrt{101}}$$

$$\sin^2 \alpha + \cos^2 \alpha = \frac{1}{10} \rightarrow (\sin^2 \alpha + \sin^2 \alpha) + \cos^2 \alpha = \frac{1}{10} \rightarrow (1 - \cos^2 \alpha) + \cos^2 \alpha = \frac{1}{10} \rightarrow 1 = \frac{1}{10}$$

سوال (۴)

$$1 + \cos^2 \alpha - \frac{2\cos^2 \alpha}{-\cos^2 \alpha} + \cos^2 \alpha = \frac{1}{10} \rightarrow \cos^2 \alpha + 1 - \cos^2 \alpha = \frac{1}{10} \rightarrow \cos^2 \alpha + \sin^2 \alpha = \frac{1}{10}$$

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

$$\rightarrow \sin x < 0 \text{ (I)} \quad \sin x \frac{\sin x}{\cos x} - \frac{1}{\cos x} < 0 \rightarrow \frac{\sin^2 x - 1}{\cos x} < 0 \rightarrow \cos x < 0 \text{ (II)}$$

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سوال (۵)

$$\frac{1}{\sin x} + \frac{1}{\cos x} = 0 \rightarrow \frac{1}{\sin x} = -\frac{1}{\cos x} \rightarrow \frac{\sin x}{\cos x} = \tan x = \frac{-1}{1} \rightarrow \cot x = \frac{1}{\tan x} = -1$$

$$\rightarrow \tan x + \cot x = \frac{1}{1} + \left(-\frac{1}{1}\right) = \frac{1 - 1}{1} = 0$$