(1)

$$\frac{1}{|\cos\alpha|} - \frac{\sin\alpha}{\cos\alpha} = \frac{1-\sin\alpha}{|\cos\alpha|} \longrightarrow \frac{-\sin\alpha}{\cos\alpha} = \frac{1-\sin\alpha-1}{|\cos\alpha|} = \frac{-\sin\alpha}{|\cos\alpha|} \longrightarrow \cos\alpha > 0$$

↓

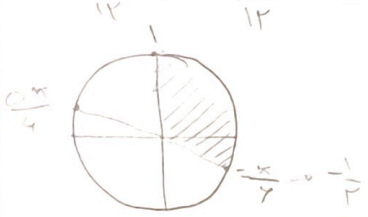
اول یا چهارم؟

$$\cot\alpha = \frac{\cos\alpha}{|\sin\alpha|} \xrightarrow{\cos\alpha>0} \cot\alpha > 0 \longrightarrow \text{اول یا سوم} \qquad \text{I} \Rightarrow \text{I} \longrightarrow \text{نمی‌تواند}$$

(2)

$$\sin^2 x = \frac{m-1}{4}$$

$$-\frac{\pi}{12} < x < \frac{5\pi}{12} \xrightarrow{\times 2} -\frac{\pi}{6} < 2x < \frac{5\pi}{6}$$




$$-\frac{1}{2} < \frac{m-1}{4} \leq 1 \xrightarrow{\times 4} -2 < m-1 \leq 4 \xrightarrow{+1} \boxed{-1 < m \leq 5}$$

(3)

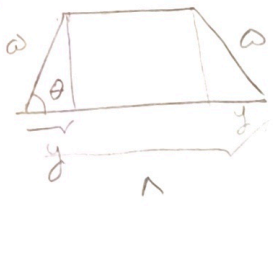
$$\tan x + \cot x = -2 \longrightarrow \frac{1}{\sin x \cdot \cos x} = -2 \longrightarrow \sin x \cdot \cos x = -\frac{1}{2}$$

$$2\pi < 4x < 4\pi \longrightarrow \frac{\pi}{2} < x < \pi$$

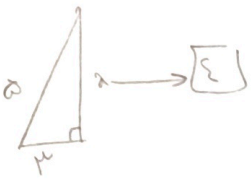
$$(\sin x - \cos x)^2 = \sin^2 x + \cos^2 x - 2\sin x \cos x = 1 - 2\left(-\frac{1}{2}\right) = 2$$

$$\frac{1}{(\sin x - \cos x)(\sin^2 x + \cos^2 x - \sin x \cdot \cos x)} = \frac{1}{-\sqrt{\frac{1}{2}}\left(1+\frac{1}{2}\right)} = \frac{\frac{\sqrt{2}}{2}}{\frac{1}{2}\left(\frac{3}{2}\right)} = \frac{\frac{\sqrt{2}}{2}}{\frac{3}{4}} = \frac{2\sqrt{2}}{3}$$

(4)




$$\cos\theta = 0.4 \longrightarrow \cos\theta = \frac{y}{5} = \frac{2}{10} \longrightarrow y = 2$$




$$S_{\text{ذوزنقه}} = \frac{4 \times (8+2)}{2} = 20$$

$$\tan(210)\tan(-150) - \sin(190)\cos(250) =$$

$$\tan(270+15)\tan(-180+15) - \sin(15)\cos(270-15) = -\cot 15 \tan 15 + \sin 15 \sin 15$$

$$-1 + \sin^2 15 = K\cos^2 15$$

$$-1 + \sin^2 15 = K - K\sin^2 15 \longrightarrow K = -1$$

(6)

$A = \sqrt{14}\cos 14^\circ \sin(14^\circ - 14^\circ) - \sqrt{2}\sin 14^\circ \cos(14^\circ - 14^\circ)$

$A = \frac{\sqrt{14}\sqrt{3}}{2} \times -\cos 14^\circ - \sqrt{2} \times \frac{\sqrt{2}}{2} \times -\cos 14^\circ = +\frac{3}{2}\cos 14^\circ + \cos 14^\circ = \cos 14^\circ\left(+\frac{3}{2}+1\right)$

$\frac{\cos 14^\circ\left(-\frac{1}{2}\right)}{\cos 14^\circ} = \boxed{+\frac{5}{2}}$

(7)

$f(x) = 14\cos^2(7x)\cos^2(4x)\cos^2(11x)\cos^2(24x)$

$f\left(\frac{\pi}{33}\right) = 14\cos^2\left(\frac{\pi}{11}\right)\cos^2\left(\frac{\pi}{4}\right)\cos^2\left(\frac{\pi}{3}\right)\cos^2\left(\frac{24\pi}{33}\right) = 14\cos^2(15^\circ) \times \frac{3}{4} \times \frac{1}{2} \times \frac{1}{4} = \frac{9+3\sqrt{3}}{14}$

$\frac{4\sqrt{3}}{4}$

$\cos^2 15^\circ = \frac{1+\cos 30^\circ}{2} = \frac{2+\sqrt{3}}{4}$

$\frac{14(1+\cos\frac{\pi}{6})}{2}$

(8)

$\frac{1-\sin x}{1+\sin x} = 4 \longrightarrow 1-\sin x = 4+4\sin x \rightarrow -3 = 5\sin x \rightarrow -\frac{3}{5} = \sin x$

$\sin x = -\frac{3}{5}$

$\cos^2\frac{x}{2} = \frac{1+\cos x}{2} = \frac{1-\frac{3}{5}}{2} = \frac{\frac{2}{5}}{2} = \frac{2}{10} = \frac{1}{5} \Rightarrow \cos\frac{x}{2} = -\sqrt{\frac{1}{5}}$

$\cos x = -\frac{4}{5}$

$\sin^2\frac{x}{2} = \frac{1-\cos x}{2} = \frac{1+\frac{4}{5}}{2} = \frac{\frac{9}{5}}{2} = \frac{9}{10} \Rightarrow \sin\frac{x}{2} = \sqrt{\frac{9}{10}}$

$\tan\frac{x}{2} = \frac{\sqrt{\frac{9}{10}}}{\sqrt{\frac{1}{10}}} = \sqrt{\frac{9}{1}} = -3$

(9)

$\frac{\sin\theta}{1-\cos\theta} + \frac{1+\cos\theta}{\sin\theta} = \frac{1}{\tan\frac{\theta}{2}} + \frac{1}{\tan\frac{\theta}{2}} = \frac{2}{\tan\frac{\theta}{2}}$

$\frac{2}{\tan\frac{\theta}{2}} = k\cot\frac{\theta}{2} = \frac{k}{\tan\frac{\theta}{2}} \Rightarrow k = 2$

(10)

$\cos\left(\frac{11x}{4}+\alpha\right) = -\sin\alpha$

$\cos 11\alpha\cos\alpha - \sin 11\alpha\sin\alpha = -\frac{\sqrt{2}}{2} \times \frac{\sqrt{2}}{2} - \frac{\sqrt{2}}{2} \times \frac{\sqrt{2}}{10} = \frac{14}{20} - \frac{2}{20} = \frac{12}{20} = 0,4$