19,5

سوال ۱ (۲)

$\cot\alpha = \frac{\cos\alpha}{\sqrt{1-\cos^2\alpha}}$ $\quad \frac{1}{\sqrt{\cos^2\alpha}} - \frac{1}{\cot\alpha} = \frac{1-\sin\alpha}{|\cos\alpha|}$

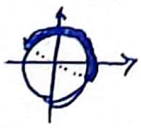
$\frac{\cos\alpha}{\sin\alpha} = \frac{\cos\alpha}{|\sin\alpha|}$ $\quad \frac{1}{|\cos\alpha|} - \frac{\sin\alpha}{\cos\alpha} = \frac{1}{|\cos\alpha|} - \frac{\sin\alpha}{|\cos\alpha|}$

$\sin\alpha = |\sin\alpha| \quad \cos\alpha = |\cos\alpha| \rightarrow \cos\alpha > 0 \ (II) \xrightarrow{II \text{ و } I}$ دربع اول ✓

$\sin\alpha > 0 \ (I)$

سوال ۲ (۲)

$\sin^2 x = \frac{m-1}{4} \quad -\frac{\pi}{12} < x < \frac{3\pi}{12} \quad -\frac{\pi}{6} < 2x < \frac{3\pi}{6}$



$-\frac{1}{2} < \sin 2x \leq 1 \quad \frac{-1}{2} < \frac{m-1}{4} \leq 1 \quad -2 < m-1 \leq 4$

$-1 < m \leq 5$ ✓

سوال ۳ (۲)

$\tan x + \cot x = -3 \quad 3\pi < 4x < 4\pi$

$\frac{1}{\sin\alpha\cos\alpha} = -3 \quad \frac{3\pi}{4} < x < \pi$

$2\sin\alpha\cos\alpha = \frac{-2}{3} \quad \cos x < 0 \quad \sin x > 0$

$|\cos x| > \sin x$

$\sin^2\alpha + \cos^2\alpha + 2\sin\alpha\cos\alpha = (\sin\alpha+\cos\alpha)^2 = \frac{1}{3}$

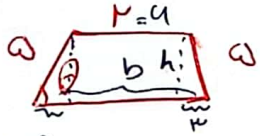
$\frac{1}{\sin^3 x + \cos^3 x} = \frac{1}{(\sin x+\cos x)(\sin^2 x - \sin x\cos x + \cos^2 x)}$

$= \frac{1}{(-\frac{1}{\sqrt{3}})(1+\frac{1}{3})} = \frac{1}{\frac{-1}{\sqrt{3}} \times \frac{4}{3}} = \frac{-3\sqrt{3}}{4}$ ✓

سوال ۴ (۲)

$\cos\theta = 0/4 \quad \sin\theta = \sqrt{1-\cos^2\theta}$

$\sin\theta = \sqrt{1-0/16} = 0/8$



قاعده بزرگ $= 2+3+3 = 8$

قاعده کوچک $= 2$

$a\cos\theta = 5\times 0/4 = 3$

$h = a\sin\theta = 5\times 0/8 = 4$

$S = \frac{(a+b)\times h}{2}$

$S = \frac{(8+2)\times 4}{2} = 20$ ✓

سوال ۵ (۲)

$\tan(28^\circ)\tan(-17^\circ) - \sin(109^\circ)\cos(25^\circ) = k\cos^2 10^\circ$

$(-\cot(10^\circ))(\tan(10^\circ)) - (\sin(10^\circ))(-\sin(10^\circ)) = k\cos^2 10^\circ$

$-1 + \sin^2 10^\circ = k\cos^2 10^\circ \Rightarrow -(1-\sin^2 10^\circ) = k\cos^2 10^\circ \Rightarrow k = -1$ ✓

$\cos^2 10^\circ$

سوال ۶ (۲)

$$A = \sqrt{۳}\cos(۱۳۰^\circ)\sin(۲۴۳۰^\circ) - \sqrt{۲}\sin(۱۲۵^\circ)\cos(۱۵۳۰^\circ)$$

$$A = \sqrt{۳}\left(-\frac{\sqrt{۳}}{۲}\right)(-\cos(۳۰^\circ)) - \sqrt{۲}\left(\frac{\sqrt{۲}}{۲}\right)(-\cos(۲۷۰^\circ)) = \cos(۲۷۰^\circ)\left(\frac{۳}{۲}+۱\right) = \frac{۵}{۲}\cos(۲۷۰^\circ)$$

$\frac{۵}{۲}$ برابر ✓

سوال ۷ (۲)

$$f(x) = ۱۶\cos^۲(۲۳x)\cos^۲(۶x)\cos^۲(۱۱x)\cos^۲(۲۴x) \qquad f\left(\frac{\pi}{۲۳}\right)$$

$$f(x) = \frac{(۴\sin(۴۶x)\cos(۲۳x)\cos(۶x)\cos(۱۱x)\cos(۲۴x))^۲}{\sin^۲(۲۳x)} = \frac{(۲\sin(۴۶x)\cos(۶x)\cos(۱۱x)\cos(۲۴x))^۲}{\sin^۲(۲۳x)}$$

$$= \frac{(\sin(۱۱۲x)\cos(۱۱۲x)\cos(۲۴x))^۲}{\sin^۲(۲۳x)} = \frac{(\sin(۴۸x)\cos(۲۴x))^۲}{۴\sin^۲(۲۳x)} = \frac{\sin(۴۸x)^۲}{۱۶\sin^۲(۲۳x)}$$

$$\frac{\sin\left(\frac{۴۸\pi}{۲۳}\right)^۲}{۱۶\sin\left(\frac{\pi}{۲۳}\right)^۲} = \frac{\left(\frac{۳}{۲۳}\right)}{۴(۲-\sqrt{۳})} = \frac{۳(۲+\sqrt{۳})}{۱۶}$$ ✓

$$\sin(۱۵^\circ) = \frac{\sqrt{۲}-\sqrt{۳}}{۲}$$

سوال ۸ (۲)

$$\frac{۱-\sin x}{۱+\sin x} = ۴ \qquad ۴\sin x + ۴ = -\sin x + ۱ \qquad ۵\sin x = -۳ \qquad \sin x = -\frac{۳}{۵}$$

$\cos x < ۰$ ، ۳ ، ۵ ، ۴

$$\cos x = -\frac{۴}{۵}$$

$$\tan\frac{x}{۲} = \frac{\sin x}{۱+\cos x} = \frac{-\frac{۳}{۵}}{۱+\left(-\frac{۴}{۵}\right)} = \frac{-\frac{۳}{۵}}{\frac{۱}{۵}} = -۳$$ ✓

سوال ۹ (۲)

$$\frac{\sin\theta}{\underbrace{۱-\cos\theta}_{۲\sin^۲\frac{\theta}{۲}}} + \frac{۱+\cos\theta}{\underbrace{\sin\theta}_{۲\sin\frac{\theta}{۲}\cos\frac{\theta}{۲}}} = ۲\cot\frac{\theta}{۲} = k\cot\frac{\theta}{۲} \Rightarrow \boxed{k=۲}$$ ✓

سوال ۱۰ (۱٫۵)

$$\sin\alpha = \frac{\sqrt{۲}}{۱۰} \qquad \cos\alpha = \sqrt{\frac{۱۰۰-۲}{۱۰۰}} = \sqrt{\frac{۹۸}{۱۰۰}} \Rightarrow \cos\alpha = \frac{-۷\sqrt{۲}}{۱۰}$$

α ناحیه دوم!

$$\cos\left(\frac{۱۱\pi}{۴}+\alpha\right)$$

$$\cos\left(\frac{۳\pi}{۴}+\alpha\right) = \frac{\sqrt{۲}}{۲}(-\cos\alpha - \sin\alpha) = +\frac{۱}{\sqrt{۲}}\left(\frac{\sqrt{۲}}{۱۰} \times ۸\right) = \frac{-۸}{۱۰} = \frac{-۴}{۵}$$ ✓

$\frac{۴\sqrt{۲}}{۱۰}$

$\frac{۳}{۵}$