(1

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

$\longrightarrow \alpha < \frac{1}{2}$

(2

$\sin 2\alpha = \frac{m-1}{4} \qquad -\frac{\pi}{12} < \alpha < \frac{5\pi}{12} \qquad -\frac{1}{2} < \sin 2\alpha \leq 1$

$\longrightarrow -\frac{1}{2} < \frac{m-1}{4} \leq 4$

$m-1 \leq 4 \longrightarrow m \leq 5$

$4 < 2-2m \longrightarrow 2m < -2 \longrightarrow m < -1$

$\longrightarrow m = (-1, 5]$

(3

$\tan + \cot = -3 \qquad \frac{3\pi}{4} < \alpha < \pi \qquad \frac{1}{\sin^3 + \cos^3} = \frac{1}{(\sin+\cos)(\sin^2+\cos^2-\sin\cos)}$

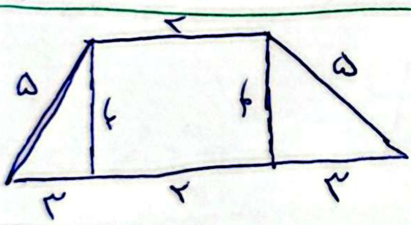
$\frac{1}{\sin\cos} = -3 \qquad \sin.\cos = -\frac{1}{3}$

$(\sin+\cos)^2 = \underbrace{\sin^2+\cos^2}_{1} + \underbrace{2\sin\cos}_{-\frac{2}{3}} \Longrightarrow \sin+\cos = \pm\frac{\sqrt{3}}{3}$

غیرقابل قبول

$\longrightarrow \frac{1}{\left(-\frac{\sqrt{3}}{3} \times \frac{4}{3}\right)} = -\frac{9}{4\sqrt{3}} = \boxed{-\frac{3\sqrt{3}}{4}}$

(4



$\cos\theta = \frac{x}{5} = 0/6 \Longrightarrow x = 3$

$9 + h^2 = 25$

$\boxed{h = 4}$

$S = \frac{(2+8)\times 4}{2} = \boxed{20}$

(5

$\tan(285)\tan(-165) - \sin(1095)\cos(255) = k\cos^2(15)$

$\tan\left(\frac{3\pi}{2}+15\right)\tan(15-\pi) - \sin(15)\cos\left(\frac{3\pi}{2}-15\right)$

$-\cot(15).\tan(15) + \sin(15) * \sin(15)$

$-1 + \sin^2(15) = -\cos^2(15) \longrightarrow k = -1$

(6

$\sqrt{3}\cos(210) \times \sin\left(\frac{3\pi}{2}-27\right) - \sqrt{2}\sin(135)\cos(\pi-27)$

$\frac{3}{2} \times \cos(27) + \cos(27) = \frac{5}{2}\cos 27^\circ$

$\frac{\frac{5}{2}\cos 27^\circ}{\cos 27^\circ} = \boxed{\frac{5}{2}}$

(7

$$f(\alpha) = 16\cos^2(3\alpha)\cos^2(6\alpha)\cos^2(12\alpha)\cos^2(24\alpha)\,.$$

$$8\left(1+\cos(6\alpha)\right)\cdot\cos^2(6\alpha)\cdot\cos^2(12\alpha)\cdot\cos^2(24\alpha) = 8\left(1+\cos\frac{\pi}{6}\right)\cdot\cos^2\left(\frac{\pi}{6}\right)$$

$$\cdot\cos^2\left(\frac{\pi}{3}\right)\cdot\cos^2\left(\frac{2\pi}{3}\right) = 8\times\frac{2+\sqrt{3}}{2}\times\frac{3}{4}\times\frac{1}{4}\times\frac{1}{4} = \boxed{\frac{6+3\sqrt{3}}{16}}$$

(8

$$\frac{1-\sin(\alpha)}{1+\sin(\alpha)} = 4 \qquad 4+4\sin\alpha = 1-\sin\alpha$$

$$5\sin\alpha = -3$$

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

$$\sin^2+\cos^2 = 1$$

$$\frac{9}{25}+\frac{16}{25} = 1$$

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

$$\tan\left(\frac{\alpha}{2}\right) = \frac{\sin(\alpha)}{1+\cos(\alpha)} = \frac{-\frac{3}{5}}{\frac{1}{5}} = \boxed{-3}$$

(9

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

$$= \frac{4\cos\left(\frac{\theta}{2}\right)}{2\sin\left(\frac{\theta}{2}\right)} = 2\cot\left(\frac{\theta}{2}\right) \Longrightarrow \boxed{k=2}$$

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(10)

$$\sin(\alpha) = \frac{\sqrt{2}}{10} \Longrightarrow \cos = \frac{49}{50} \qquad -\frac{7}{5\sqrt{2}} = \frac{-7\sqrt{2}}{10}$$

$$\cos\left(\frac{11\pi}{4}+\alpha\right) = \cos\left(\frac{3\pi}{4}+\alpha\right) = \cos\frac{3\pi}{4}\times\cos\alpha-\sin\frac{3\pi}{4}\times\sin\alpha$$

$$\frac{\sqrt{2}}{2}\times\frac{7\sqrt{2}}{10}-\frac{\sqrt{2}}{10}\times\frac{\sqrt{2}}{2} \Longrightarrow \frac{7}{10}-\frac{1}{10} = \boxed{\frac{6}{10}}$$