۱) تبدیل نسبت‌های مثلثاتی

$\cot\alpha = \frac{\cos\alpha}{\sqrt{1-\cos^2\alpha}} \cdot \frac{1}{\sqrt{\cos^2\alpha}} \cdot \frac{1}{\cot\alpha} = \frac{1-\sin\alpha}{|\cos\alpha|}$ (۱,۷۵)

عدد مثلثاتی

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

$\rightarrow 1-\cos^2\alpha = \sin^2\alpha$

$\Rightarrow \cot\alpha = \frac{\cos\alpha}{|\sin\alpha|} \Rightarrow \sin\alpha > 0$

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

$\Rightarrow \cos > 0$ (۵)

۲) نامساوی

$\frac{-\pi}{12} < \alpha < \frac{5\pi}{12}$

$\frac{-\pi}{4} < 2m < \frac{5\pi}{4}$

$\sin 2\alpha = \frac{m-1}{2}$

$\min = -\frac{1}{2}$

$\max = 1$

$\Rightarrow -\frac{1}{2} < \frac{m-1}{2} < 1$ (۱,۷۵)

$-2 < m-1 < 2$

$-1 < m < 3$

چه مقادیری m؟

$\frac{1}{\sin^3 m + \cos^3 m} = ?$

۳) $\tan m + \cot m = -2$ ، $\frac{3\pi}{2} < 2m < 2\pi$

$\frac{3\pi}{4} < \alpha < \pi$

$\frac{\sin m}{\cos m} + \frac{\cos m}{\sin m} = \frac{1}{\sin m \cos m}$ (۱)

$\rightarrow \sin m \cos m = -\frac{1}{2}$

$\frac{1}{(\sin m + \cos m)} \times \frac{1}{(\cos^2 m + \sin^2 m - \sin m \cos m)}$

$\frac{1}{2} \qquad 1 + \frac{1}{2} = \frac{3}{2}$

$= \frac{1}{\frac{3}{2}} = \frac{2}{3}$

$(\sin m + \cos m)^2 = \sin^2 m + \cos^2 m + 2\sin m \cos m$

$1 + 2x - \frac{1}{2} = 1 - \frac{1}{2} = \frac{1}{2}$

۴) $S = ?$

$\cos\theta = 0.4$

$1 - \cos^2\theta = \sin^2\theta \rightarrow 1 - 0.16 = 0.84 \rightarrow \sin\theta = 0.9$

$\rightarrow S = \frac{4 \times (2+8)}{2} = 20$ (۵)

$\sin\theta = 0.9 = \frac{AH}{6} \rightarrow AH = 5.4$

$\tan(\pi\alpha)\tan(-14\alpha) - \sin(1090\alpha)\cos(720\alpha)$

$k\cos^2 10^\circ - \tan\left(\frac{3\pi}{2}+10\right)\tan(\pi-10) - \sin(4\pi+10)\cos\left(\frac{3\pi}{2}-10\right)$

$k = ?$

$-\cot(10)\tan(10) + \sin(10)\sin(10)$

$-1 + \sin^2(10) = -(1-\sin^2(10)) = -\cos^2 10$

$\rightarrow k = -1$

$A = \sqrt{2}\cos(210)\sin(24\pi) - \sqrt{2}\sin(150)\cos(10\pi)$

$\frac{A}{\cos(270)} = ?$

$\sqrt{2}\times\left(-\frac{\sqrt{2}}{2}\right)\times\sin(24\pi) - \sqrt{2}\times\frac{\sqrt{2}}{2}\times\cos(10\pi)$

$-\frac{1}{2}\times\sin\left(\frac{3\pi}{2}-2\pi\right) - \cos(\pi-2\pi)$

$+\frac{1}{2}\cos(2\pi) + \cos(2\pi) = \frac{3}{2}\cos(2\pi)$

$\frac{\frac{3}{2}\cos(2\pi)}{\cos(2\pi)} = \frac{3}{2}$

$f(\alpha) = 14\cos^2(2\alpha)\cos^2(4\alpha)\cos^2(12\alpha)\cos^2(24\alpha)$

$f\left(\frac{\pi}{24}\right) = ?\quad 14\cos^2\left(\frac{\pi}{12}\right)\cos^2\left(\frac{\pi}{6}\right)\cos^2\left(\frac{\pi}{3}\right)\cos^2\left(\frac{2\pi}{3}\right)$

$\frac{3}{4}$ $\qquad$ $\frac{1}{2}$

$\cos 2\alpha = \cos\frac{\pi}{6} = \frac{\sqrt{3}}{2}$

$\frac{3}{14}\times 14\cos^2\left(\frac{\pi}{12}\right)\cos^2\left(\frac{2\pi}{3}\right) \rightarrow 3\cos^2\left(\frac{\pi}{12}\right)\cos^2\left(\frac{2\pi}{3}\right)$

$\frac{1}{2}$

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

$\Rightarrow \left(\frac{\sqrt{3}+2}{4}\right)\times\frac{1}{2}\times 3 = \frac{3\sqrt{3}+6}{16}$

$\frac{1-\sin\alpha}{1+2\sin\alpha} = 2 \qquad \tan\frac{\alpha}{2} = ?$

$1-\sin^2\alpha = \cos^2\alpha \qquad 1-\sin\alpha = 4+4\sin\alpha$

$\Rightarrow 1-\frac{9}{25} = \frac{16}{25} \qquad -3 = 5\sin\alpha$

$= \frac{4}{5} \qquad -\frac{3}{5} = \sin\alpha$

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

$\cos\alpha = 1-2\sin^2\frac{\alpha}{2} \qquad \sin\frac{\alpha}{2} = \sqrt{\frac{1-\cos\alpha}{2}} = \sqrt{\frac{1+\frac{4}{5}}{2}}$

$\cos\alpha = 2\cos^2\frac{\alpha}{2} - 1 \qquad \cos\frac{\alpha}{2} = \sqrt{\frac{1+\cos\alpha}{2}} = \sqrt{\frac{1-\frac{4}{5}}{2}}$

$\tan\frac{\alpha}{2} = \frac{\frac{3}{\sqrt{10}}}{\frac{1}{\sqrt{10}}} = 3$

$\sqrt{\frac{1}{10}}$

$\frac{\sin\theta}{1-\cos\theta} + \frac{1+\cos\theta}{\sin\theta}\cdot\frac{2\cos^2\frac{\theta}{2}}{2} = \kappa \cot\frac{\theta}{2}$ $\quad \kappa = ?$ (۹

$1-\cos\theta \to 2\sin^2\frac{\theta}{2}$

$\sin\theta$

$\Rightarrow \frac{2\sin\frac{\theta}{2}\cdot\cos\frac{\theta}{2}}{2\sin^2\frac{\theta}{2}} + \frac{2\cos^2\frac{\theta}{2}}{2\sin\frac{\theta}{2}\times\cos\frac{\theta}{2}}$ (۵)

$\cot\frac{\theta}{2} + \cot\frac{\theta}{2} = 2\cot\frac{\theta}{2} \Rightarrow \kappa = 2$

$\kappa\cot\frac{\theta}{2}$

α $\quad \sin\alpha = \frac{\sqrt{2}}{10}$ $\quad \cos\left(\frac{11\pi}{2}+\alpha\right) = ?$

$\cos(\quad$
$\sin\rangle$.

$\cos\left(\frac{8\pi+3\pi}{2}\right) = \cos\left(2\pi+\frac{3\pi}{2}+\alpha\right)$ (۱۰

$= \cos\left(\frac{3\pi}{2}+\alpha\right)$

$\cos\frac{3\pi}{2}\cos\alpha - \sin\frac{3\pi}{2}\sin\alpha = +\frac{\sqrt{2}}{2}\times\frac{\sqrt{98}}{10} - \frac{\sqrt{2}}{2}\times\frac{\sqrt{2}}{10}$

$\cos\alpha = \sqrt{1-\frac{2}{100}}$ (۵)

$\cos\alpha = \frac{\sqrt{98}}{10}$

$\frac{\sqrt{196}}{20} - \frac{2}{20} = \frac{14-2}{20} = \frac{12}{20} = \frac{6}{10} = 0/6$

۳) $\frac{\sin^2\alpha+\cos^2\alpha}{\sin\alpha\cos\alpha} = -3 \to \sin\alpha\cos\alpha = -\frac{1}{3} = A$

$A^2 = \sin^2\alpha+\cos^2\alpha+2\sin\alpha\cos\alpha = \frac{1}{9}$

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

$\to A \begin{cases} \frac{1}{\sqrt{3}} \times \\ -\frac{1}{\sqrt{3}} \checkmark \end{cases}$ $\quad \frac{-4}{4\sqrt{3}} = -0/58\sqrt{3}$

۴) $A = \sqrt{3}\times 1 - \frac{\sqrt{3}}{2}\times\sin(270-27) - \sqrt{2}\times\frac{\sqrt{2}}{2}\cos(180-27)$

$\to \frac{3}{2}\cos(27) \to$ برابر $\frac{3}{2}$