محمد شیرازی ۱۱/B

۱- $\frac{\cos a}{\sin a} = \frac{\cos a}{|\sin a|} \Rightarrow \sin a > 0$ } $0 < a < \frac{\pi}{2} \to$ ناحیه اول

$\frac{1}{|\cos a|} - \frac{\sin a}{\cos a} = \frac{1-\sin a}{\cos a} \to \cos a > 0$

۲- $-\frac{\pi}{6} < 3x < \frac{7\pi}{6}$

$-\frac{1}{2} < \sin 3x \le 1$

$-\frac{1}{2} < \frac{m-1}{4} \le 1$

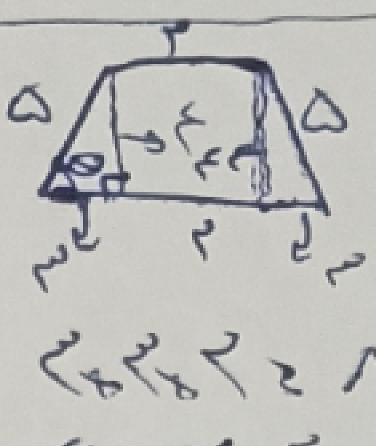
$-1 < m \le 5$

۳- $\tan x + \cot x = \frac{2}{\sin 2x} = -3 \to \sin 2x = -\frac{2}{3}$

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

$\sin^3 x + \cos^3 x = (\sin + \cos)(\cos^2 + \sin^2 - \sin\cos) = \frac{\sqrt{3}}{3} \times \frac{4}{3} = \frac{4\sqrt{3}}{9}$

$\frac{1}{\sin^3 x + \cos^3 x} = \frac{1}{\frac{4\sqrt{3}}{9}} = \frac{9}{4\sqrt{3}} = \frac{3\sqrt{3}}{4}$

۴- 

$3 + 2 + 3 = 8$

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

۵- $\tan 285^\circ = \tan(270 + 15) = -\cot 15^\circ$

$\tan(-165^\circ) = \tan(-180 + 15) = -\tan(180 - 15) = \tan 15$

$\sin(1095^\circ) = \sin(3 \times 360 + 15) = \sin 15$

$\cos 255^\circ = \cos(270^\circ - 15^\circ) = -\sin 15^\circ$

$-\cot 15 \times \tan 15 - \sin 15 \times -\sin 15 = -1 + \sin^2 15 = -\cos^2 15^\circ$

$k = -1$

۶- $\cos 210 = -\frac{\sqrt{3}}{2}$ $\quad \sin(243^\circ) = \sin(\frac{3\pi}{2} - 27) = -\cos 27$

$\sin 135 = \frac{\sqrt{2}}{2}$ $\quad \cos(153^\circ) = \cos(\pi - 27) = -\cos 27$

$\Rightarrow \sqrt{3} \times \frac{-\sqrt{3}}{2} \times -\cos 27^\circ - \sqrt{2} \times \frac{\sqrt{2}}{2} \times -\cos 27$

$= -\cos 27^\circ(-\frac{3}{2} - 1) \to \frac{-\cos 27^\circ(-\frac{3}{2} - 1)}{\cos 27^\circ} = \frac{3}{2} + 1 = \frac{5}{2} = 2.5$

۷- $8(2\cos^2 15) = 8(\frac{\cos 30 + 1}{2}) = 8(\frac{\sqrt{3}+2}{4}) = (2\sqrt{3} + 4)$

$(2\sqrt{3} + 4) \times (\frac{\sqrt{3}}{2})^2 \times (\frac{1}{2})^2 \times (-\frac{1}{2})^2 = (2\sqrt{3} + 4) \times \frac{3}{4} \times \frac{1}{4} \times \frac{1}{4} = \frac{3(2\sqrt{3} + 4)}{64}$

۸- $1 - \sin x = 4 + 4\sin x \to \sin x = -\frac{3}{5} \to \cos x = -\frac{4}{5} \to \tan x = \frac{3}{4}$

$\tan x = \frac{2\tan\frac{x}{2}}{1 - \tan^2\frac{x}{2}} \Rightarrow \tan\frac{x}{2} = -3$

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

$= \frac{4\sin\frac{\theta}{2}\cos\frac{\theta}{2}}{2\sin^2\frac{\theta}{2}} = \frac{2\cos\frac{\theta}{2}}{\sin\frac{\theta}{2}} = 2\cot\frac{\theta}{2}$

$k = 2$

۱۰- $\cos(\frac{11\pi}{4} + a) = \cos(\frac{3\pi}{4} + a)$

$\cos\frac{3\pi}{4} \cdot \cos a - \sin\frac{3\pi}{4}\sin a =$

$\cos = -\sqrt{1 - \frac{2}{100}} = \frac{-\sqrt{98}}{10}$

$\frac{-\sqrt{2}}{2} \cdot \frac{-\sqrt{98}}{10} - \frac{\sqrt{2}}{2} \cdot \frac{\sqrt{2}}{10} = \frac{-\sqrt{2}}{2}(\frac{-\sqrt{98}}{10} - \frac{\sqrt{2}}{10}) = \frac{\sqrt{196}}{20} + \frac{2}{20} = \frac{14+2}{20} = \frac{16}{20} = \frac{4}{5}$

$= 0.8$