

$$1. a) \sin \frac{\pi}{5} = \cos \underline{\hspace{1cm}} \quad b) 2 \cos^2 \left(\frac{\pi}{14} \right) - 1 = \cos \underline{\hspace{1cm}} \quad c) \frac{1}{4} \sin \frac{1}{3} \theta \cos \frac{1}{3} \theta =$$

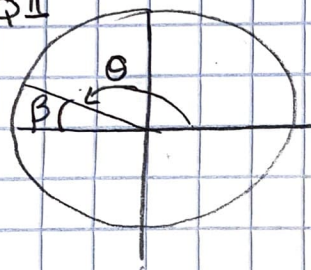
$$\frac{\pi}{2} - \frac{\pi}{5} = \left(\frac{3\pi}{10} \right)$$

$$2 \left(\frac{\pi}{14} \right) = \left(\frac{\pi}{7} \right)$$

$$\Rightarrow \left(\frac{1}{8} \sin \frac{2}{3} \theta \right)$$

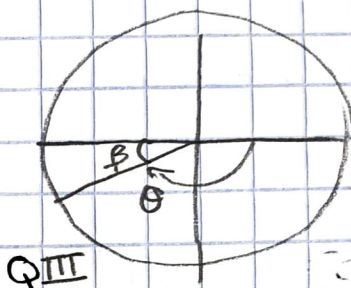
$$2. a) \sin \left(\frac{21\pi}{25} \right) = \sin \frac{4\pi}{25}$$

QII



$$\beta = \pi - \frac{21\pi}{25} = \frac{4\pi}{25}$$

$$b) \tan \left[-\frac{7\pi}{8} \right] = \tan \frac{\pi}{8}$$



$$\beta = \pi - \frac{7\pi}{8} = \frac{\pi}{8}$$

$$3. a) \sin (2\pi - x) = -\sin x$$

$$\underbrace{\sin 2\pi}_{0} \cos x - \underbrace{\cos 2\pi}_{1} \sin x$$

$$= -\sin x$$

$$b) \tan (-x) = -\tan x$$

$$\tan (0 - x) = \frac{\tan (0) - \tan x}{1 - \tan (0) \tan x}$$

$$= -\tan x$$

$$c) \cos \left[\frac{\pi}{2} + x \right] = -\sin x$$

$$= \underbrace{\cos \frac{\pi}{2}}_0 \cos x - \underbrace{\sin \frac{\pi}{2}}_1 \sin x$$

$$= -\sin x$$

4. a) $\cos 15^\circ$

$$\cos (45^\circ - 30^\circ)$$

$$= \cos 45^\circ \cos 30^\circ + \sin 45^\circ \sin 30^\circ$$

$$= \frac{\sqrt{2}}{2} \left(\frac{\sqrt{3}}{2} \right) + \frac{\sqrt{2}}{2} \left(\frac{1}{2} \right)$$

$$= \frac{\sqrt{6} + \sqrt{2}}{4}$$

b) $\cot \frac{7\pi}{12}$

$$\tan \left(\frac{\pi}{3} + \frac{\pi}{4} \right)$$

$$= \frac{\tan \frac{\pi}{3} + \tan \frac{\pi}{4}}{1 - \tan \frac{\pi}{3} \tan \frac{\pi}{4}}$$

$$= \frac{\sqrt{3} + 1}{1 - \sqrt{3}} \cdot \frac{1 + \sqrt{3}}{1 + \sqrt{3}}$$

* reciprocal

$$\cot \frac{7\pi}{12} = \frac{1 - \sqrt{3}}{\sqrt{3} + 1} \cdot \frac{\sqrt{3} - 1}{\sqrt{3} - 1}$$

$$= \frac{-4 + 2\sqrt{3}}{2} = \sqrt{3} - 2$$

$$5. a) 4\sec x + 2 = 7 + 2\sec x$$

$$4\sec x - 2\sec x = 7 - 2$$

$$2\sec x = 5$$

$$\sec x = \frac{5}{2}$$

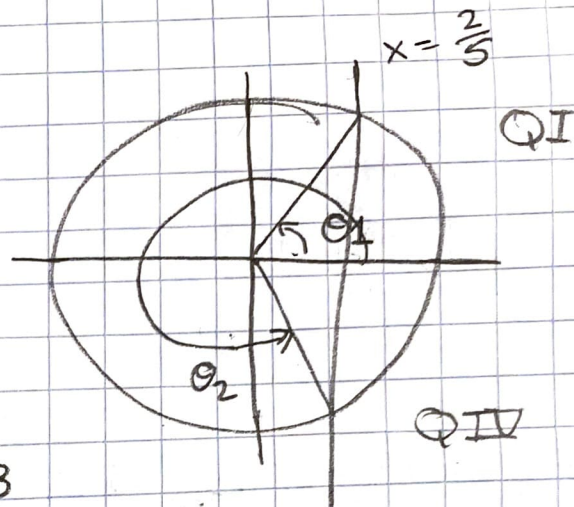
$$\cos x = \frac{2}{5}$$

$$\beta = \cos^{-1}\left(\frac{2}{5}\right) = 1.1593$$

$$\theta_1 = 1.1593$$

$$\theta_2 = 2\pi - 1.1593 = 5.1239$$

$$x = 1.1593, 5.1239$$



$$b) \sin x - \sqrt{3} \sin x \cos x = 0$$

$$\sin x (1 - \sqrt{3} \cos x) = 0$$

$$1 - \sqrt{3} \cos x = 0$$

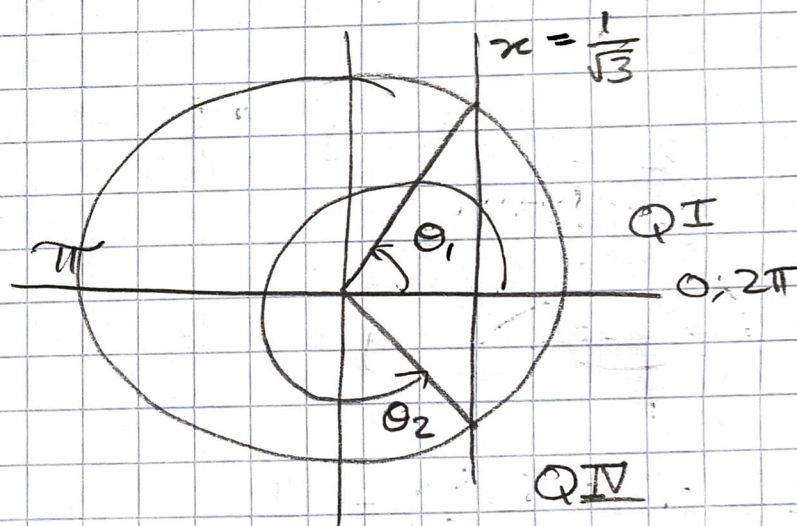
$$\cos x = \frac{1}{\sqrt{3}}$$

$$\beta = \cos^{-1}\left(\frac{1}{\sqrt{3}}\right) = 0.9553$$

$$\theta_1 = 0.9553$$

$$\theta_2 = 2\pi - 0.9553 = 5.3279$$

$$x = 0, 0.9553, 5.3279, \pi, 2\pi$$



$$5. c) 6 \cos^2 x - 2 = -5 \sin x$$

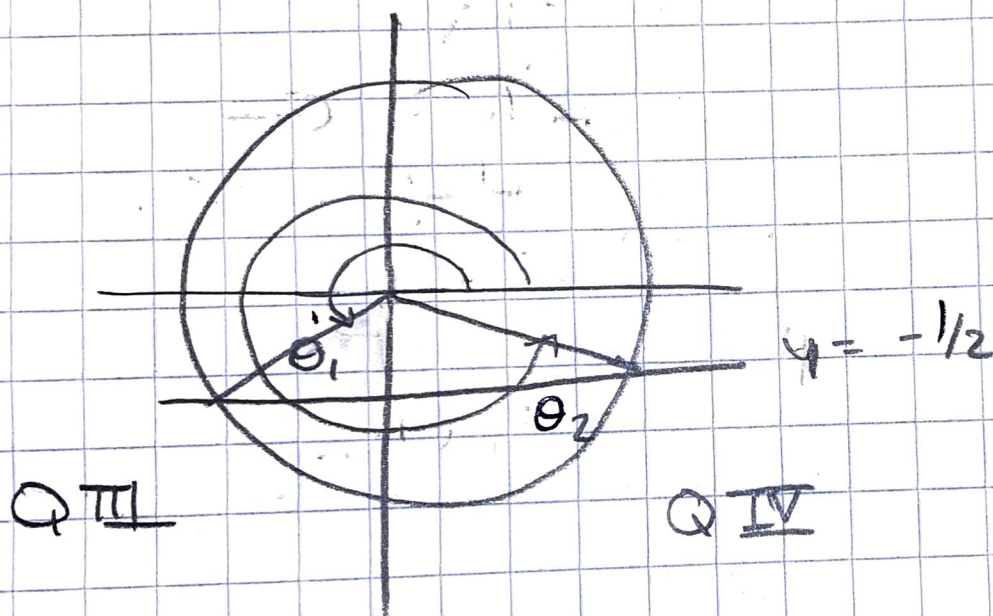
$$6(1 - 5 \sin^2 x) - 2 = -5 \sin x$$

$$- [6 \sin^2 x - 5 \sin x - 4] = 0$$

$$6a^2 - 5a - 4 = 0$$

$$(2a+1)(3a-4) = 0$$

$$\sin x = -\frac{1}{2}, \frac{4}{3} \text{ (no solution)}$$



$$\beta = \sin^{-1}(\frac{1}{2}) = \frac{\pi}{6}$$

$$\theta_1 = \pi + \frac{\pi}{6} = \frac{7\pi}{6}$$

$$\theta_2 = 2\pi - \frac{\pi}{6} = \frac{11\pi}{6}$$

$$x = \frac{7\pi}{6}, \frac{11\pi}{6}$$

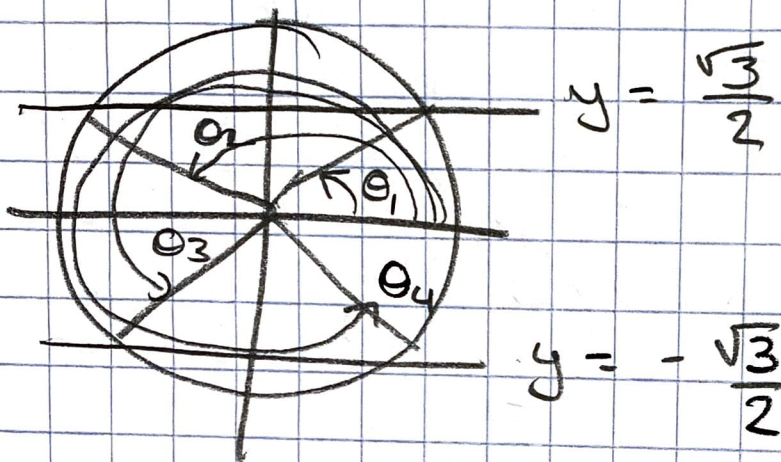
$$6. \quad 4\sin^2(2x) - 3 = 0, \quad 0 \leq x \leq \pi$$

$$4\sin^2 2x = 3$$

$$\sin^2 2x = \frac{3}{4}$$

$$\sin 2x = \pm \frac{\sqrt{3}}{2}$$

$$\sin 2x =$$



$$\theta = \sin^{-1}\left(\frac{\sqrt{3}}{2}\right) = \frac{\pi}{3}$$

$$\theta_1 = \frac{\pi}{3}$$

$$\theta_2 = \pi - \frac{\pi}{3} = \frac{2\pi}{3}$$

$$\theta_3 = \pi + \frac{\pi}{3} = \frac{5\pi}{3}$$

$$2x = \frac{\pi}{3}, \frac{2\pi}{3}, \frac{4\pi}{3}, \frac{5\pi}{3}$$

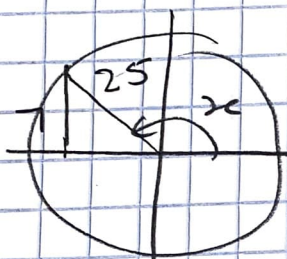
divide by 2.

add by 2π

$$x = \frac{\pi}{6}, \frac{\pi}{3}, \frac{2\pi}{3}, \frac{5\pi}{6}, \frac{7\pi}{6}$$

8. $\cos x$ is positive in QI and QIV.
 $\cos x$ is negative in QII and QIII.
 When we take square root of both sides of equation, we get positive or negative value.

7. $\sin 2x = 2 \sin x \cos x$



$$x = \sqrt{25^2 - 7^2} \quad (\text{QII})$$

$$= -24$$

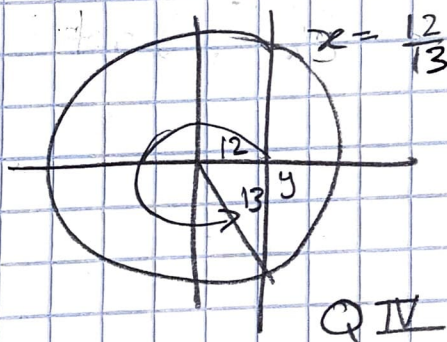
$$\cos x = -\frac{24}{25}$$

$$\sin(2x) = 2 \left(\frac{7}{25} \right) \left(-\frac{24}{25} \right)$$

$$= -\frac{336}{625}$$

take reciprocal.

$$\csc 2x = -\frac{625}{336}$$



$$x = \frac{12}{13}$$

$$y = \sqrt{13^2 - 12^2}$$

$$= -5$$

$$\sin y = -\frac{5}{13}$$

$$\tan y = \frac{-5/13}{12/13} = -\frac{5}{12}$$

$$\tan x = \frac{7/25}{-24/25}$$

$$= -\frac{7}{24}$$

$$\tan(x - y) = \frac{\tan x - \tan y}{1 - \tan x \tan y}$$

$$= \frac{-7/24 - (-5/12)}{1 + (-7/24)(-5/12)}$$

$$= \frac{36}{223}$$