

11

$$\sin(\alpha + \alpha) = \sin \alpha \cos \alpha + \cos \alpha \sin \alpha = 2 \sin \alpha \cos \alpha$$

$$\sin(\alpha + \beta) = \sin \alpha \cos \beta + \cos \alpha \sin \beta$$

$$\sin(3x + x) = \sin(3x) \cos x + \cos(3x) \sin x$$

$$\underline{\sin(4x)}$$

$$\underline{\sin(2\theta) = 2 \sin \theta \cos \theta}$$

$$\underline{\sin(2\alpha) = 2 \sin \alpha \cos \alpha}$$

$$\sin(4\theta) = 2 \sin 2\theta \cos 2\theta$$

$$\underline{\sin(2020\theta) = 2 \sin(1010\theta) \cos(1010\theta)}$$

$$\underline{\sin(4x) = 2 \sin(2x) \cos(2x)}$$

D]

$$\begin{array}{ccc} \overset{\alpha}{\sin 3x} \overset{\beta}{\cos x} \oplus \overset{\alpha}{\cos 3x} \overset{\beta}{\sin x} & = & \sin(3x + x) \\ \underset{\alpha}{\sin 3x} \underset{\beta}{\cos x} & & \sin(3x - x) \\ & & \cos(3x + x) \\ & & \cos(3x - x) \end{array} \left. \vphantom{\begin{array}{ccc} \overset{\alpha}{\sin 3x} \overset{\beta}{\cos x} \oplus \overset{\alpha}{\cos 3x} \overset{\beta}{\sin x} & = & \sin(3x + x) \\ \underset{\alpha}{\sin 3x} \underset{\beta}{\cos x} & & \sin(3x - x) \\ & & \cos(3x + x) \\ & & \cos(3x - x) \end{array}} \right\}$$

$$\sin(4x) = 2 \sin(2x) \cos(2x)$$

$$\sin(\alpha + \beta) = \sin \alpha \cos \beta + \cos \alpha \sin \beta$$

$$\begin{array}{cc} \uparrow & \uparrow \\ 2x & 2x \end{array} = \sin(2x) \cos(2x) + \cos(2x) \sin(2x)$$

$$= \underline{\underline{2 \sin(2x) \cos(2x)}}$$

$$\sin(3x) \cos x - \sin x \cos(3x) = \sin(3x - x)$$

$$\cos(3x) \cos x + \sin(3x) \sin x = \cos(3x - x)$$

$$\cos(3x) \cos x - \sin(3x) \sin x = \cos(3x + x)$$

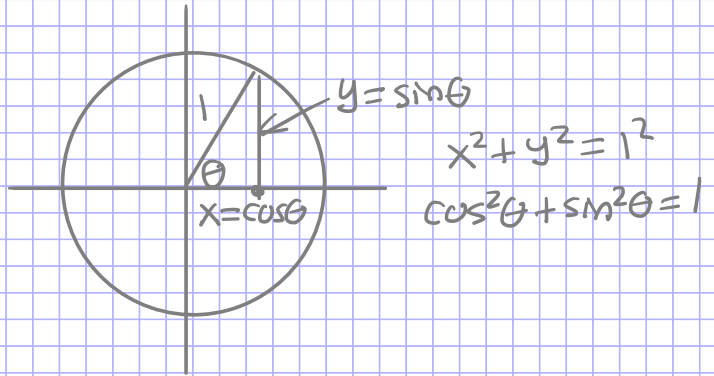
$$\overset{x}{\cos(\alpha + \beta)} = \overset{x}{\cos \alpha} \overset{x}{\cos \beta} - \overset{x}{\sin \alpha} \overset{x}{\sin \beta}$$

$$\cos(2x) = (\cos x)^2 - (\sin x)^2$$

$$(\cos x)^2 - (1 - \cos^2 x)$$

$$= 2 \cos^2 x - 1$$

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



$$\frac{\cos^2 \theta + \sin^2 \theta}{\cos^2 \theta} = \frac{1}{\cos^2 \theta}$$

$$1 + \tan^2 \theta = \sec^2 \theta$$

2) $4 \cos^2 x = 3$

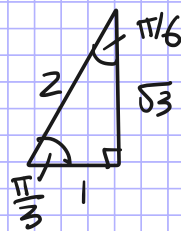
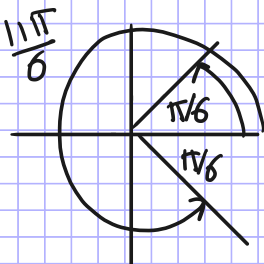
$$0 \leq x < 2\pi$$

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

$$\sqrt{\frac{3}{4}} = \frac{\sqrt{3}}{\sqrt{4}} = \left(\frac{\sqrt{3}}{2}\right)$$

$$\cos x = \pm \sqrt{\frac{3}{4}} = \pm \left(\frac{\sqrt{3}}{2}\right)$$

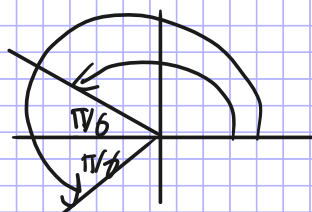
$$\cos x = \frac{\sqrt{3}}{2}$$



$$\pi/6, 11\pi/6$$

$$\cos x = -\frac{\sqrt{3}}{2}$$

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



B)

$$\frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{11\pi}{6}$$

3)

$$5 \sin^2 x = \cos x$$

$$0 \leq x < 2\pi$$

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

$$\sin^2 x = 1 - \cos^2 x$$

$$\sqrt{\sin^2 x} = \sqrt{1 - \cos^2 x}$$

$$\pm \sin x = \pm \sqrt{1 - \cos^2 x}$$

$$\sin^2 x = 1 - \cos^2 x$$

$$5(1 - \cos^2 x) = \cos x$$

$$-5 \cos^2 x - \cos x + 5 = 0$$

$$5 \sin^2 x = \cos x$$

$$5 \sin^2 x = \cos x$$

$$5(1 - \cos^2 x) = \cos x$$

$$-5 \cos^2 x - \cos x + 5 = 0$$

$$\cos x = \frac{-(-1) \pm \sqrt{(-1)^2 - 4(-5)(5)}}{2(-5)}$$

$$\cos x = \frac{1 \pm \sqrt{101}}{-10}$$

$$\cos x = \frac{1 - \sqrt{101}}{-10}, \frac{1 + \sqrt{101}}{-10}$$

$$0.905$$

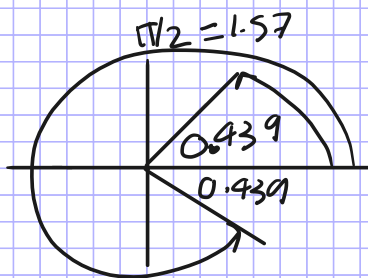
$$\downarrow$$

$$0.439$$

$$-1.105$$

not possible

B)



$$2\pi - 0.439$$

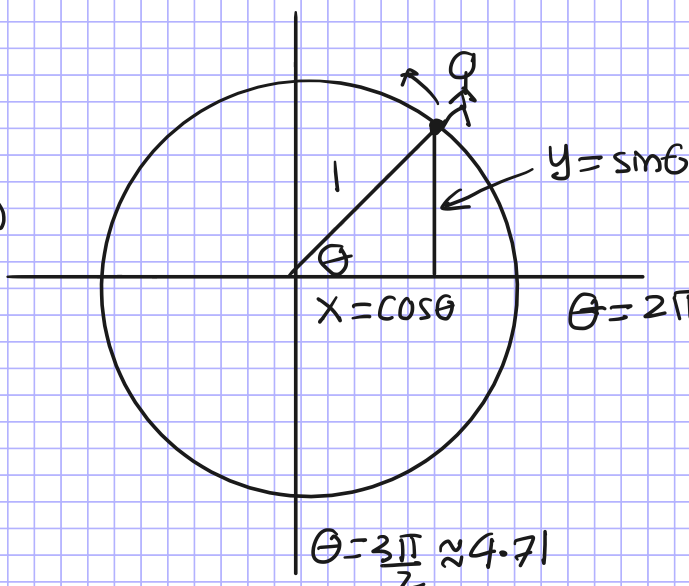
$$5.844$$

$$0.439$$

$$\theta = \pi/2 \approx 1.57$$

$$(3, 14)$$

$$\theta = \pi$$

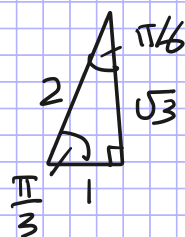


$$\theta = 2\pi \quad (6.28)$$

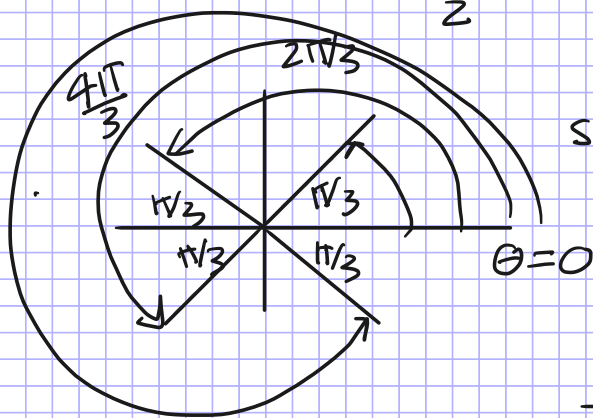
$$\theta = 3\pi/2 \approx 4.71$$

$$|\sin \theta| = \frac{\sqrt{3}}{2}$$

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



$$\sin \theta = -\frac{\sqrt{3}}{2}$$



$$2\pi - \frac{\pi}{3} = \frac{5\pi}{3}$$

SOH CAH TOH

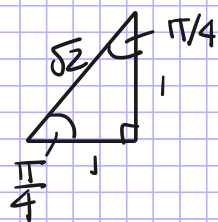
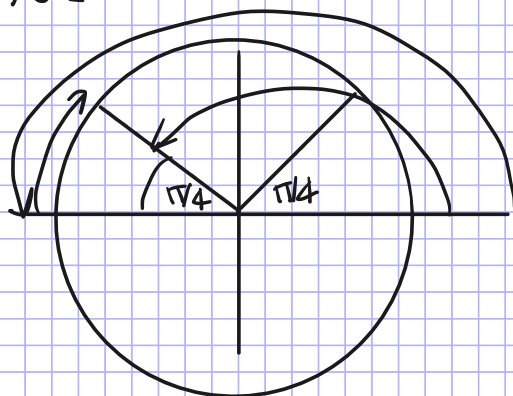
$$\theta = \pi/3$$

$$\theta = \frac{2\pi}{3}$$

$$\theta = \frac{4\pi}{3}$$

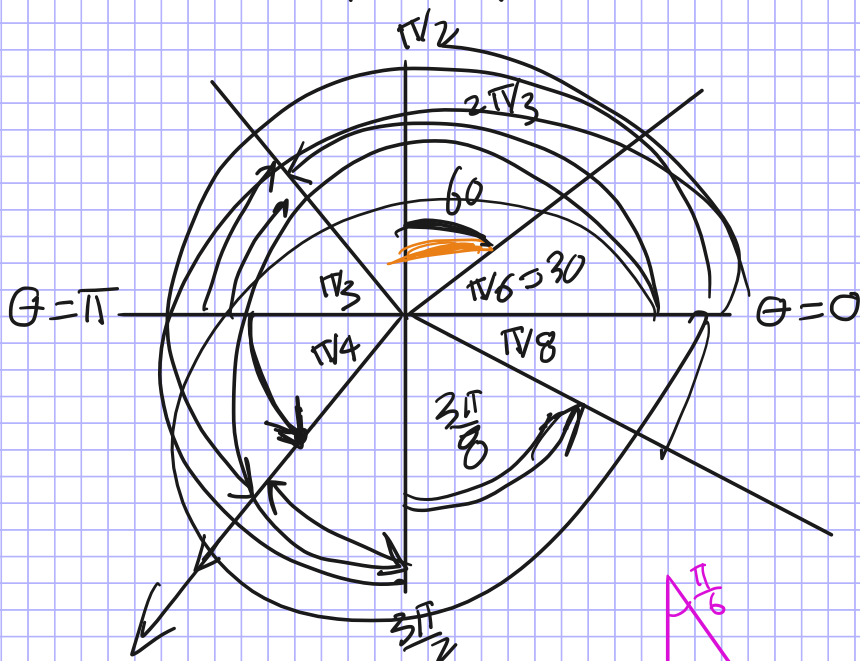
$$\theta = \frac{5\pi}{3}$$

$$\sin \theta = 1/\sqrt{2}$$



$$\theta = \frac{3\pi}{4} \quad \theta = \pi/4$$

$$\pi - \frac{\pi}{4} = \frac{3\pi}{4}$$



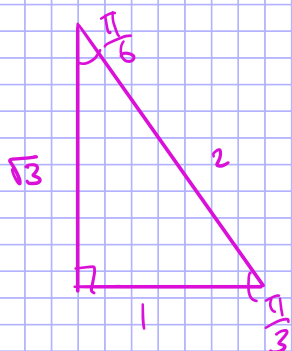
$$\pi - \frac{\pi}{3}$$

$$\frac{3\pi}{\pi} - \frac{\pi}{3}$$

$$\frac{2\pi}{3}$$

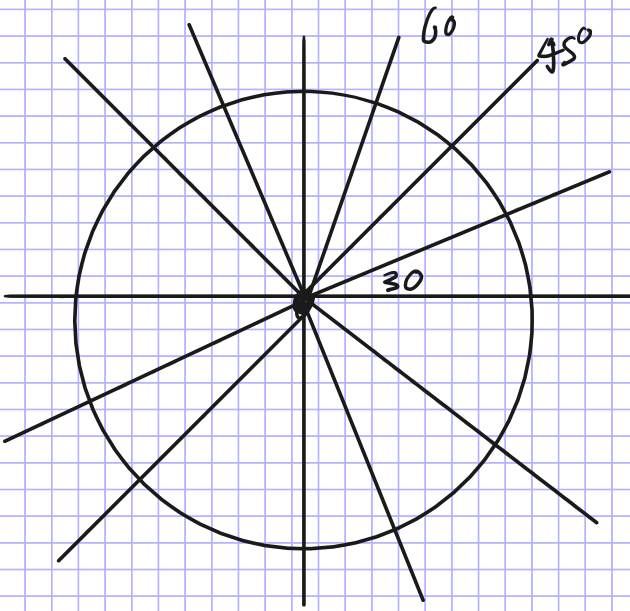
$$\pi + \frac{\pi}{4}$$

$$\frac{5\pi}{4}$$



$$\left\{ \begin{aligned} \frac{3\pi}{2} + \frac{3\pi}{8} &= \frac{24\pi + 6\pi}{16} \\ 2\pi - \pi/8 &= \frac{15\pi}{8} \end{aligned} \right.$$

$$\frac{30\pi}{16} \pm \frac{15\pi}{8}$$



4]

$$\frac{\sec x}{2\sin x + 1}$$

$$\frac{1}{\cos x}$$

$$\cos x \neq 0$$

$$2\sin x + 1 \neq 0$$

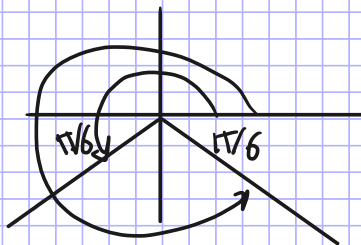
$$2\sin x = -1$$

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

$$\cos x \neq 0$$

$$x \neq \pi/2$$

$$x \neq \frac{3\pi}{2}$$



$$\boxed{\frac{7\pi}{6}, \frac{11\pi}{6}}$$

$$\frac{7\pi}{6} + 2n\pi$$

$$\frac{11\pi}{6}$$

51

