

6.4 Solving Trig Equations Using Identities

Non-Permissible Values:
When the function is undefined

$$\frac{3x}{x+2}$$

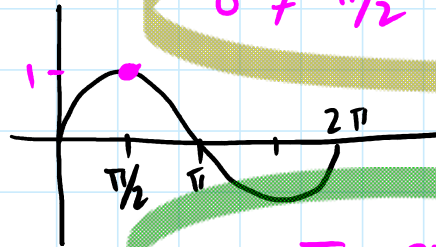
$$x+2 \neq 0 \\ x \neq -2$$

#1 a) $\frac{\cos \theta}{1 - \sin \theta}$

$$1 - \sin \theta \neq 0$$

$$1 \neq \sin \theta$$

$$\theta \neq \frac{\pi}{2} \text{ if } 0 \leq \theta < 2\pi$$



$$\theta \neq \frac{\pi}{2} + 2\pi n \quad n \in \mathbb{I}$$

b) $3 \cot \theta$

$$3 \frac{\cos \theta}{\sin \theta}$$

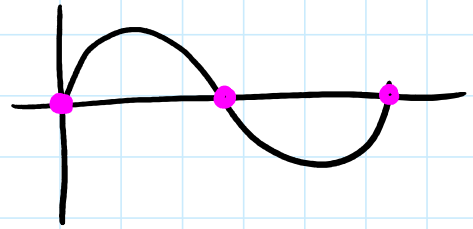
$\cot \theta$ has asymptotes
when $\sin \theta = 0$

$\therefore \cot \theta$ undefined when
 $\sin \theta = 0$

$$\sin \theta \neq 0$$

$$\theta \neq \pi + \pi n$$

$$\theta = \pi n \quad n \in \mathbb{I}$$



2 Solve $0 \leq \theta < 2\pi$ Exact Values

$$\cos 2\theta + 1 - \cos \theta = 0$$

① Use an identity
 $\cos 2\theta = 2\cos^2 \theta - 1$

$$2\cos^2 \theta - 1 + 1 - \cos \theta = 0$$

$$2\cos^2 \theta - \cos \theta = 0$$

② Factor then solve

$$\cos \theta (2\cos \theta - 1) = 0$$

$$\downarrow$$

$$\cos \theta = 0$$

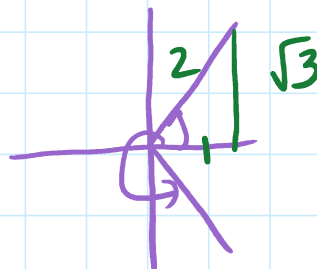
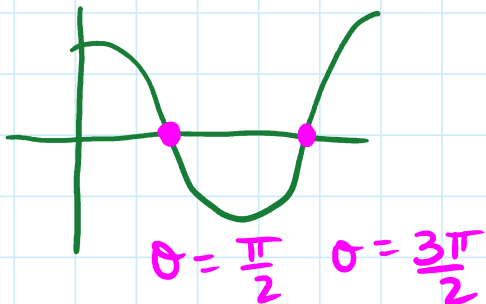
$$\downarrow$$

$$2\cos \theta - 1 = 0$$

$$2\cos \theta = 1$$

$$\cos \theta = \frac{1}{2}$$

③ Draw a diagram.



$$\text{ref } \angle = \frac{\pi}{3}$$

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

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

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

3 Solve $0 \leq \theta < 2\pi$

Exact Values

$$1 - \cos^2 \theta = 3\sin \theta - 2$$

$$\sin^2 \theta - 2\sin \theta + 1 = 0$$

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

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

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

$$\sin^2 \theta = 3 \sin \theta - 2$$

$$|\sin^2 \theta - 3 \sin \theta + 2 = 0$$

$$(\sin \theta - 1)(\sin \theta - 2) = 0$$

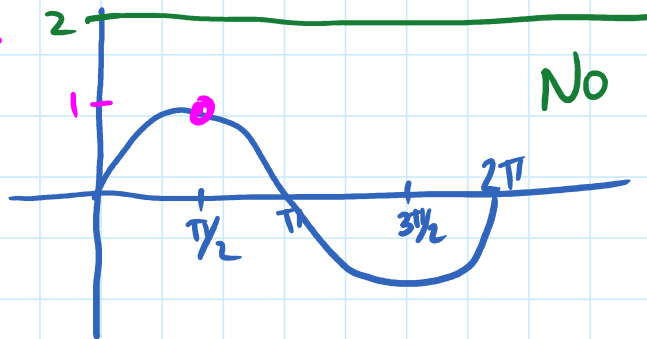
$$\sin \theta - 1 = 0$$

$$\sin \theta = 1$$

$$\sin \theta - 2 = 0$$

$$\sin \theta = 2$$

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



No Solution

# 4 Solve  $0^\circ \leq \theta < 360^\circ$  Exact Values

$$\cos^2 \theta = \cot \theta \sin \theta$$

$$\cos^2 \theta = \frac{\cos \theta \cdot \cancel{\sin \theta}}{\cancel{\sin \theta}}$$

$$\cos^2 \theta = \cos \theta$$

$$\cot \theta = \frac{\cos \theta}{\sin \theta}$$

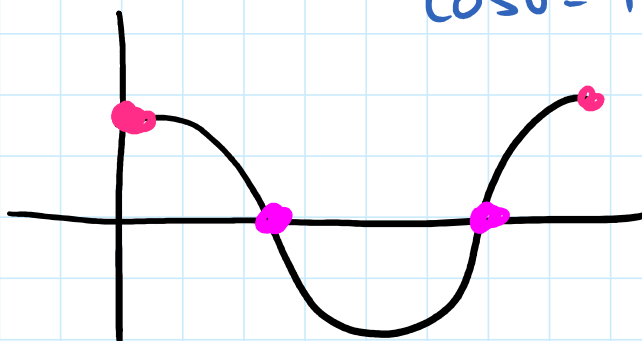
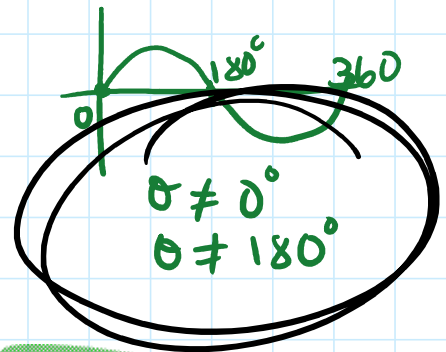
$$\sin \theta \neq 0$$

$$\cos^2 \theta - \cos \theta = 0$$

$$\cos \theta (\cos \theta - 1) = 0$$

$$\cos \theta = 0$$

$$\begin{aligned} \cos \theta - 1 &= 0 \\ \cos \theta &= 1 \end{aligned}$$



$$\begin{aligned} \theta &= 90^\circ \\ \theta &= 270^\circ \end{aligned}$$

$$\begin{aligned} \theta &= 0^\circ \\ \theta &= 360^\circ \end{aligned}$$

not permitted.  
not in domain