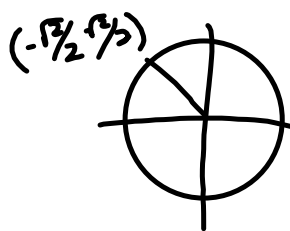
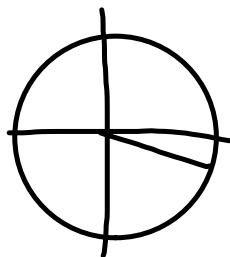


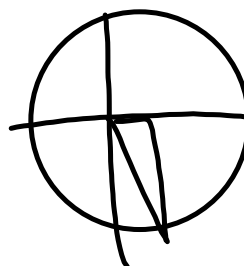
$$\cos\left(\frac{3\pi}{4}\right) = -\frac{\sqrt{2}}{2}$$



$$\sin\left(\frac{11\pi}{6}\right) = -\frac{1}{2}$$



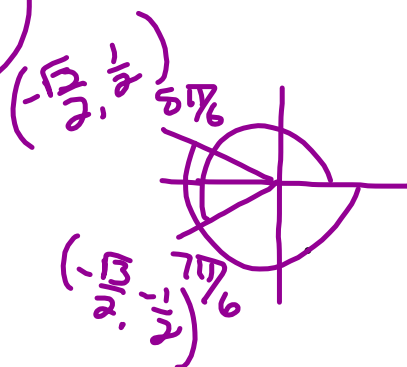
$$\cos\left(\frac{5\pi}{3}\right) = \frac{1}{2}$$



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

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

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



## Solving Trigonometric Equations

- In order to solve a trigonometric equation:
  - Move anything outside the trigonometric function to the other side.
  - Use the Unit Circle to undo, or find the inverse of, that trigonometric function (there is usually more than one answer).
  - Continuing around the Unit Circle continues to add more and more answers. Therefore, add  $+2\pi n$  to each answer, where "n" represents each additional trip around the Unit Circle.
  - Continue solving each resulting equation. Note: adding or subtracting does not change the period ( $+2\pi n$ ), but multiplying or dividing does.

- Example:

$$\frac{2 \cos\left(6\theta - \frac{\pi}{2}\right)}{2} = \frac{\sqrt{2}}{2}$$

*Where is cosine  $\frac{\sqrt{2}}{2}$ ?*

$$\cos^{-1}\left(\cos\left(6\theta - \frac{\pi}{2}\right)\right) = \cos^{-1}\left(\frac{\sqrt{2}}{2}\right)$$

$$6\theta - \frac{\pi}{2} = \frac{\pi}{4}$$

$$+ \frac{\pi}{2} \quad + \frac{\pi}{2} = \frac{2\pi}{4}$$


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$$\frac{1}{6} \cdot 6\theta = \frac{3\pi}{4} \cdot \frac{1}{6} = \frac{3\pi}{24}$$

$$\theta = \frac{\pi}{8} \quad \leftarrow \text{Reduce}$$

$$6\theta - \frac{\pi}{2} = \frac{7\pi}{4}$$

$$+ \frac{\pi}{2} \quad + \frac{\pi}{2} = \frac{2\pi}{4}$$


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$$\frac{1}{6} \cdot 6\theta = \frac{9\pi}{4} \cdot \frac{1}{6} = \frac{9\pi}{24}$$

$$\theta = \frac{3\pi}{8}$$

- Example:

$$4 \sin^2\left(\frac{\theta}{2} - \frac{\pi}{4}\right) - 1 = 2$$

$$\sin^2 \theta = (\sin \theta)^2$$

$$\sin^2 \theta \neq \sin \theta^2$$

$$\frac{\theta}{2} - \frac{\pi}{4} = \frac{\pi}{3}$$

$$\sin^2\left(\frac{\theta}{2} - \frac{\pi}{4}\right) = \frac{3}{4}$$

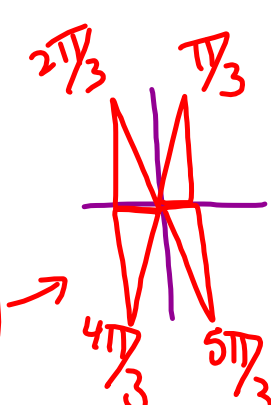
$$\sqrt{\left[\sin\left(\frac{\theta}{2} - \frac{\pi}{4}\right)\right]^2} = \sqrt{\frac{3}{4}}$$

$$\sin\left(\frac{\theta}{2} - \frac{\pi}{4}\right) = \pm \frac{\sqrt{3}}{2}$$

$$\frac{\theta}{2} - \frac{\pi}{4} = \frac{2\pi}{3}$$

$$\frac{\theta}{2} - \frac{\pi}{4} = \frac{4\pi}{3}$$

$$\frac{\theta}{2} - \frac{\pi}{4} = \frac{5\pi}{3}$$



- Example:

$$4 \cot(4\theta - \pi) + 2 = 2$$