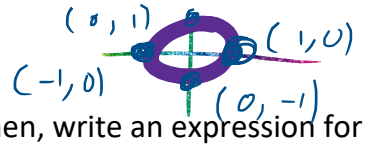
Warm-up!



Solve over $0 \leq \theta < 2\pi$. Then, write an expression for all of the solutions.

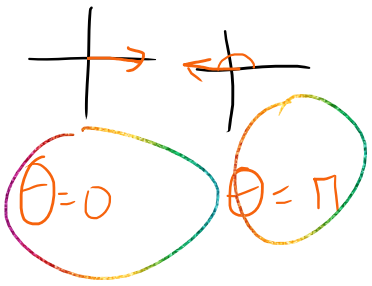
$$(\tan\theta)(\tan\theta + 1) = 0$$

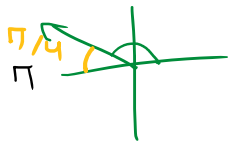
$\frac{y}{x} = 0$

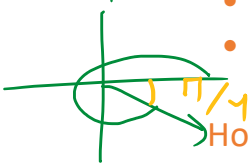
$\tan\theta = 0$

$\tan\theta + 1 = 0$

$\tan\theta = -1$







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

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

$2\pi - \frac{\pi}{4}$

$\theta = \frac{7\pi}{4}$

$\theta = 0 + 2\pi k$

$\theta = \pi + 2\pi k$

$\theta = \pi k$

$\theta = \frac{3\pi}{4} + 2\pi k$

$\theta = \frac{7\pi}{4} + 2\pi k$, $k \in \mathbb{Z}$

where k is any integer

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

Trig Functions, Day 6

- Speed Quiz 3
- More Solving
- (3.12) Pythagorean Identities
- Some notation

Quiz Two Classes From Now

- Solving
- Identities

Homework: Pythagorean Identities

Weird thing we sometimes do…

Instead of $(\sin\theta)$, we write…

$\sin^2\theta$

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

First, solve over $0 \leq \theta < 2\pi$. Then, write an expression for ALL the solutions.

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

$2(\cos\theta)^2 + \cos\theta = 0$

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

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

$\cos\theta = 0$ $\quad$ $\cos\theta = -\frac{1}{2}$

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

$2k^2 + k = 0$

$(k)(2k+1) = 0$

$k = 0$ $\quad$ $k = -\frac{1}{2}$

$\cos\theta = 0$ $\quad$ $\cos\theta = -\frac{1}{2}$

$\theta = \frac{\pi}{2} + 2\pi k$ $\quad$ $\theta = \frac{3\pi}{2} + 2\pi k$ $\quad$ $\theta = \frac{2\pi}{3} + 2\pi k$ $\quad$ $\theta = \frac{4\pi}{3} + 2\pi k$, $k \in \mathbb{Z}$

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

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

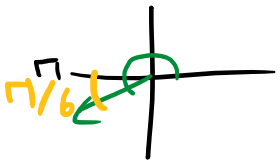
$$2\sin^2\theta - \sin\theta - 1 = 0$$

$2A^2 - A - 1 = 0$

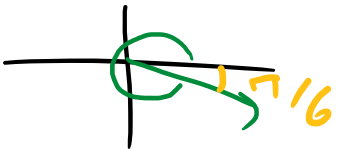
$(2A + 1)(A - 1) = 0$

$A = -\frac{1}{2}$ $A = 1$

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



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



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

$\sin\theta = 1$

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

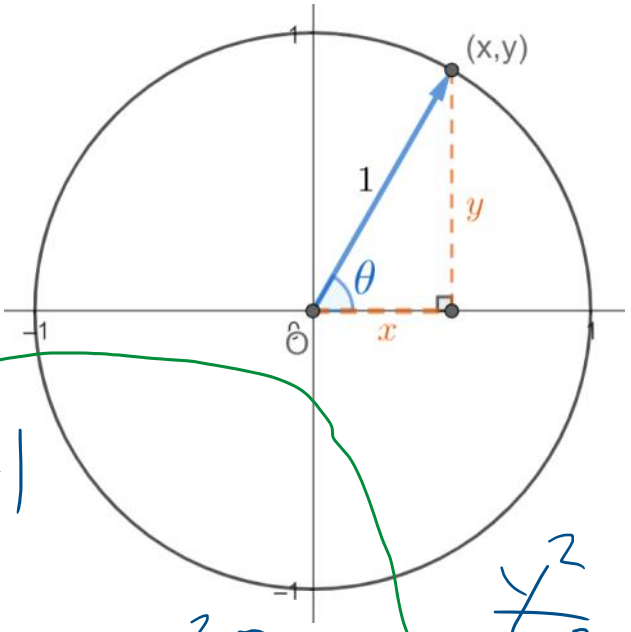
First, solve over $0 \leq \theta < 2\pi$. Then, write an expression for ALL the solutions.

$$2\sin^2\theta + 3 = 7\sin\theta$$

The Pythagorean Identities

$x^2 + y^2 = 1$

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



$\cos\theta = x$
$\sin\theta = y$
$\tan\theta = \frac{y}{x}$
$\sec\theta = \frac{1}{x}$
$\csc\theta = \frac{1}{y}$
$\cot\theta = \frac{x}{y}$

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

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

$\cot^2\theta + 1 = \csc^2\theta$

$\frac{y^2}{x^2} = \left(\frac{y}{x}\right)^2$

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

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

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

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

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

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

$1 - x^2 - x - 1 = 0$

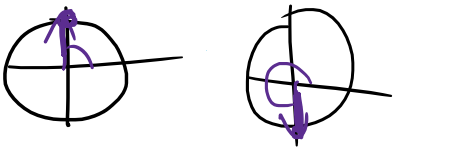
$-x^2 - x = 0$

$x^2 + x = 0$

$(x)(x+1) = 0$

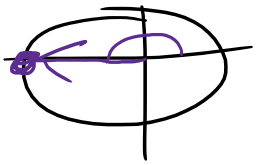
$x = 0 \qquad x = -1$

$\cos\theta = 0$



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

$\cos\theta = -1$



$\theta = \pi$

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

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

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

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

$\sec^2\theta - 1 = \sec\theta - 1$

$x^2 - 1 = x - 1$

$x^2 = x$

$x^2 - x = 0$

$(x)(x-1) = 0$

$x = 0 \quad x = 1$

$\frac{1}{x}$

$\sec\theta = 0$

impossible

$\sec\theta = 1$

$\cos\theta = 1$

$\theta = 0$

First, solve over $0 \leq \theta < 2\pi$. Then, write an expression for ALL the solutions.

$$\csc\theta \sec\theta - \csc\theta + 2\sec\theta = 2$$

First, solve over $0 \leq \theta < 2\pi$. Then, write an expression for ALL the solutions.

$\tan^3\theta = 3\tan\theta$

$\tan^3\theta - 3\tan\theta = 0$

$(\tan\theta)(\tan^2\theta - 3) = 0$

$\tan\theta = 0$ or $\tan^2\theta - 3 = 0$

$\tan\theta = \sqrt{3}$ or $\tan\theta = -\sqrt{3}$

$\theta = 0 + 2\pi k$, $\theta = \pi + 2\pi k$

$\theta = \pi k$

$\theta = \frac{\pi}{3} + 2\pi k$, $\theta = \frac{4\pi}{3} + 2\pi k$

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

$\theta = \frac{2\pi}{3} + 2\pi k$, $\theta = \frac{5\pi}{3} + 2\pi k$

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

$x^3 = 3x$

$x^3 - 3x = 0$

$(x)(x^2 - 3) = 0$

$x = 0$, $x = \pm\sqrt{3}$

$\sin\alpha\cos\alpha = \sin\alpha$

$\sin\alpha\cos\alpha - \sin\alpha = 0$

$(\sin\alpha)(\cos\alpha - 1) = 0$

$\sin\alpha = 0$ or $\cos\alpha - 1 = 0$

$\alpha = 0$, $\alpha = \pi$

$\cos\alpha - 1 = 0$

$\cos\alpha = 1$

$\alpha = 0$

$\theta = \frac{\pi}{3}k$, $k \in \mathbb{Z}$