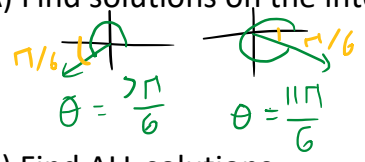
Warm-up!

A) Find solutions on the interval $0 \le \theta < 2\pi$



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

B) Find ALL solutions

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

$\theta = \frac{7\pi}{6} + 2\pi k$ $\theta = \frac{11\pi}{6} + 2\pi k$, where k is any integer

C) Find ALL solutions

$$\sin(3\theta) = -\frac{1}{2}$$

Let $x = 3\theta$

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

$x = \frac{7\pi}{6} + 2\pi k$ $x = \frac{11\pi}{6} + 2\pi k$, $k \in \mathbb{Z}$

$3\theta = \frac{7\pi}{6} + 2\pi k$ $3\theta = \frac{11\pi}{6} + 2\pi k$

$\theta = \frac{7\pi}{18} + \frac{2\pi k}{3}$ $\theta = \frac{11\pi}{18} + \frac{2\pi k}{3}$, $k \in \mathbb{Z}$

D) Find ALL solutions

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

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

$\sin(y) = -\frac{1}{2}$

$y = \frac{7\pi}{6} + 2\pi k$ $y = \frac{11\pi}{6} + 2\pi k$

$\theta - \frac{2\pi}{3} = \frac{7\pi}{6} + 2\pi k$ $\theta - \frac{2\pi}{3} = \frac{11\pi}{6} + 2\pi k$

$\theta = \frac{11\pi}{6} + 2\pi k$ $\theta = \frac{15\pi}{6} + 2\pi k$

Advanced Trig Day 3:
(3.10) Solving "multiple angle" problems

Homework: Solving Multiple Angle Equations + Review

Next Quiz: Day 6

- Solving Trig Equations
- Solving Inverse Trig Equations
- Trig Identities
- Quiz is on Day 1 - Day 4

$\theta = \frac{11\pi}{6} + 2\pi k$

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

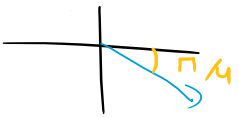
$\theta = \frac{11\pi}{6} + 2\pi k$

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

Find ALL solutions

cos

$\cos(y) = \frac{\sqrt{2}}{2}$



$y = \frac{\pi}{4} + 2\pi k$

$y = \frac{7\pi}{4} + 2\pi k$

$x + \frac{\pi}{2} = \frac{\pi}{4} + 2\pi k$

$x + \frac{\pi}{2} = \frac{7\pi}{4} + 2\pi k$

$x = -\frac{\pi}{4} + 2\pi k$

$x = \frac{5\pi}{4} + 2\pi k$

$\cos(x)\cos\left(\frac{\pi}{2}\right) - \sin(x)\sin\left(\frac{\pi}{2}\right) = \frac{\sqrt{2}}{2}$

$\cos x \cdot 0 - \sin x \cdot 1 = \frac{\sqrt{2}}{2}$

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

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

$x = \frac{5\pi}{4} + 2\pi k$ $x = -\frac{\pi}{4} + 2\pi k$

Find ALL solutions

$$\tan(2x) = 1$$

$\tan(y) = 1$

$y = \frac{\pi}{4} + 2\pi k$ $\qquad$ $y = \frac{5\pi}{4} + 2\pi k$

$y = \frac{\pi}{4} + \pi k$

$2x = \frac{\pi}{4} + 2\pi k$ $\qquad$ $2x = \frac{5\pi}{4} + 2\pi k$

$2x = \frac{\pi}{4} + \pi k$

$x = \frac{\pi}{8} + \pi k$ $\qquad$ $x = \frac{5\pi}{8} + \pi k, \; k \in \mathbb{Z}$

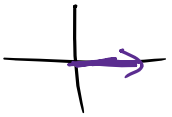
$x = \frac{\pi}{8} + \frac{\pi}{2} k$

Find ALL solutions.
Then list only the solutions in the interval $0 \leq \theta < 2\pi$

$$\cos(3\theta - \pi) = 1$$

$3\theta - \pi = 2\pi n$

$\cos(y) = 1$



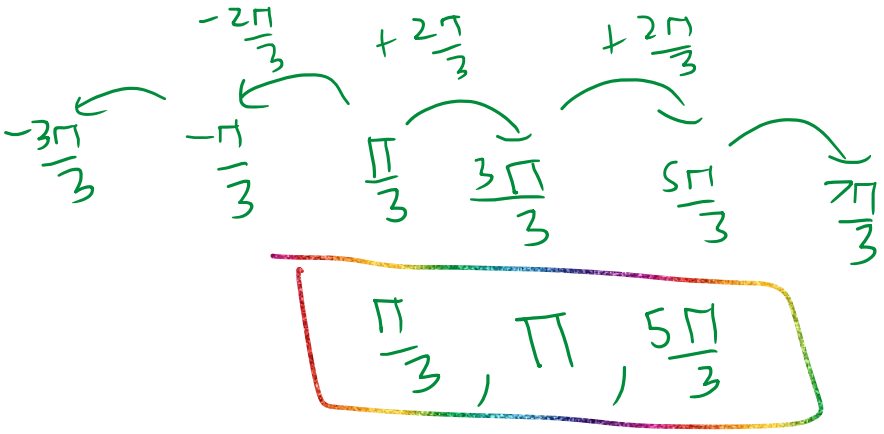
$y = 0 + 2\pi k$

$3\theta - \pi = 0 + 2\pi k$

$3\theta = \pi + 2\pi k$

All solutions: $\theta = \frac{\pi}{3} + \frac{2\pi k}{3}$, $k \in \mathbb{Z}$

Solutions in the interval $0 \leq \theta < 2\pi$:



$\frac{\pi}{3}, \pi, \frac{5\pi}{3}$

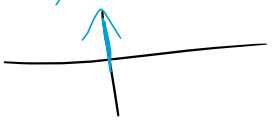
Find an expression for all x-values at which $y = \sec\left(\frac{1}{3}x\right)$ has vertical asymptotes.

$$y = \sec\left(\frac{1}{3}x\right)$$

$$y = \frac{1}{\cos\left(\frac{1}{3}x\right)}$$

$$\cos\left(\frac{1}{3}x\right) = 0$$

$$\cos(y) = 0$$



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

$$\frac{1}{3}x = \frac{\pi}{2} + 2\pi k$$

$$x = \frac{3\pi}{2} + 6\pi k$$

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

$$\frac{1}{3}x = \frac{3\pi}{2} + 2\pi k$$

$$x = \frac{9\pi}{2} + 6\pi k$$

Find an expression for all x-values at which $y = \cot\left(x - \frac{\pi}{2}\right)$ has vertical asymptotes.

$y = \cot\left(x - \frac{\pi}{2}\right)$

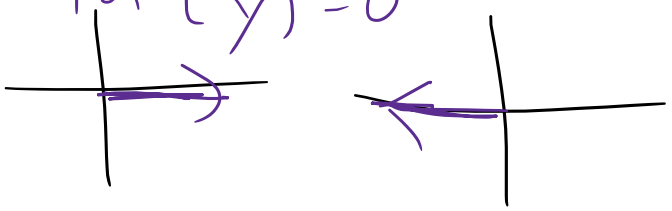
$y = \cot\left(x - \frac{\pi}{2}\right)$

$y = \frac{1}{\tan\left(x - \frac{\pi}{2}\right)}$

$y = \frac{\cos\left(x - \frac{\pi}{2}\right)}{\sin\left(x - \frac{\pi}{2}\right)}$

$\tan\left(x - \frac{\pi}{2}\right) = 0$

$\tan(y) = 0$



$\sin\left(x - \frac{\pi}{2}\right) = 0$

$y = 0 + 2\pi k$

$y = \pi + 2\pi k$

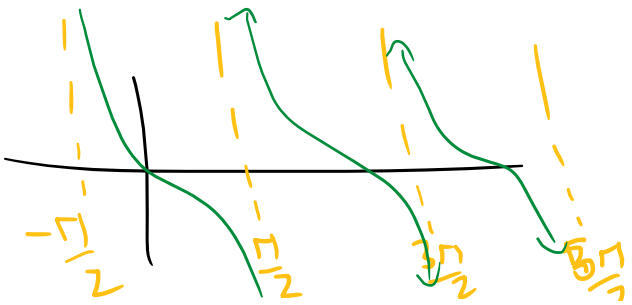
$x - \frac{\pi}{2} = 0 + 2\pi k$

$x - \frac{\pi}{2} = \pi + 2\pi k$

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

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

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




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

The function f is given by $f(\theta) = 2\cos^2(2\theta) + 1$.
The function g is given by $g(\theta) = 3\cos(2\theta)$.

Find an expression for all input values at which the graphs of f and g intersect.

Review of inverse trig equations

Solve each of the following:

$$\arctan(4x - 3) = -\frac{\pi}{4}$$

$$\sin^{-1}\left(\frac{x}{2}\right) = \arccos\left(\frac{1}{2}\right)$$

For each function, find an expression for the x-values of the vertical asymptotes.

$$f(x) = 3\csc\left(x - \frac{\pi}{4}\right)$$

$$g(x) = \tan(4\pi x) - 2$$

Review of Advanced Trig Identities: Evaluate each of the following.

A) $\sin\left(\frac{\pi}{12}\right)\cos\left(\frac{\pi}{4}\right) - \cos\left(\frac{\pi}{12}\right)\sin\left(\frac{\pi}{4}\right)$

B) $1 - 2\sin^2\left(\frac{7\pi}{8}\right)$

C) $30\sin\left(\frac{3\pi}{8}\right)\cos\left(\frac{3\pi}{8}\right)$

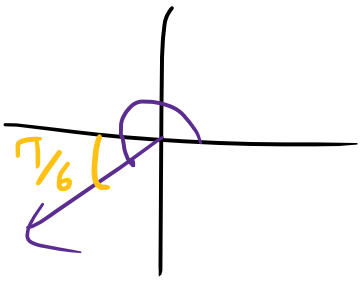
Find an expression for ALL solutions

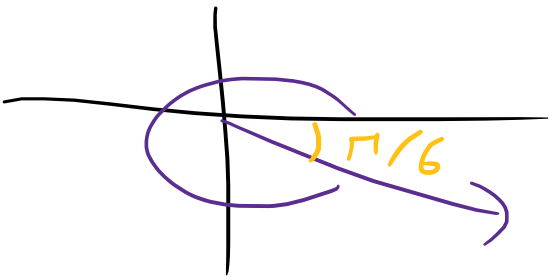
$$6\sin^2(3x) + 5 = 8$$

$$\sin(3\theta) = -\frac{1}{2}$$

Let $3\theta = X$

$\sin(X) = -\frac{1}{2}$





$X = \frac{7\pi}{6} + 2\pi k$

$3\theta = \frac{7\pi}{6} + 2\pi k$

$\theta = \frac{7\pi}{18} + \frac{2\pi k}{3}$

$X = \frac{11\pi}{6} + 2\pi k$

$3\theta = \frac{11\pi}{6} + 2\pi k$

$\theta = \frac{11\pi}{18} + \frac{2\pi k}{3}$