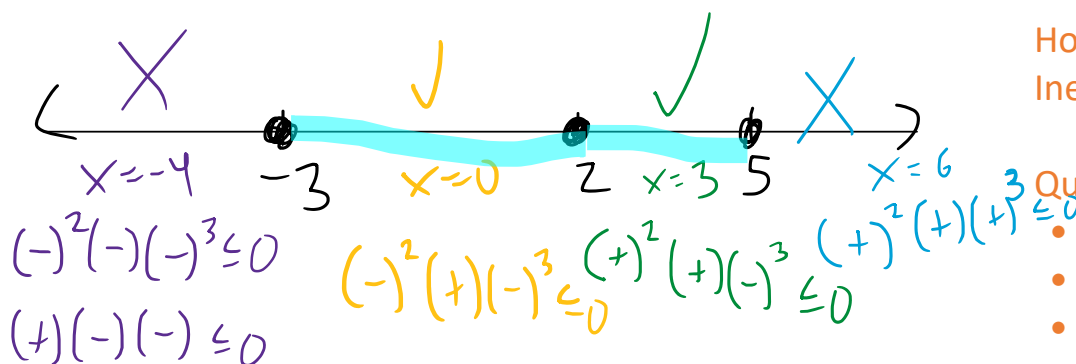


Warm-up!

A) Solve the inequality:
(x - 2)

$$[-3, 5]$$



Periodic Graphs Day 8:

- Trig Inequalities (3.10)
- Calculator Skills

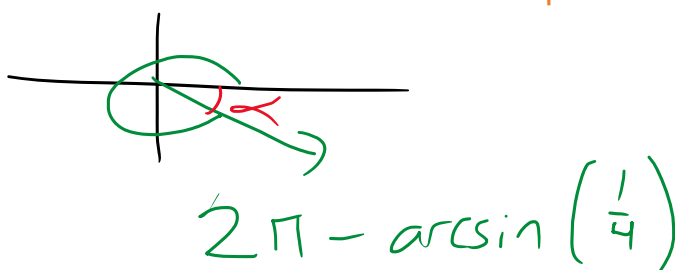
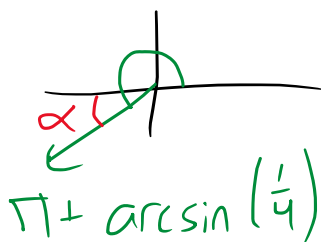
Homework: Trigonometric Inequalities

Quiz Next Class:

- An FRQ #3 style question
- Graphs of tan/cot/sec/csc
- Solving Trig Equations using Inverse Trig
- Solving Inverse Trig Equations
- Evaluating Inverse Trig Expressions

B) Solve over the interval

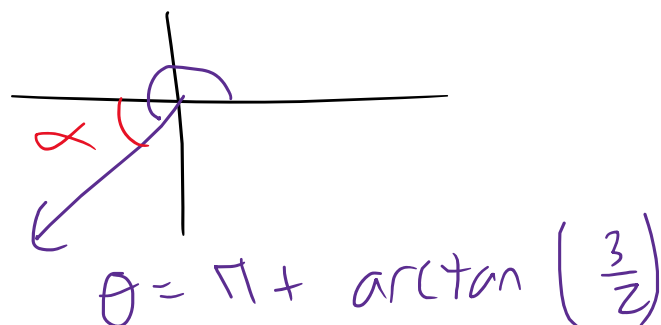
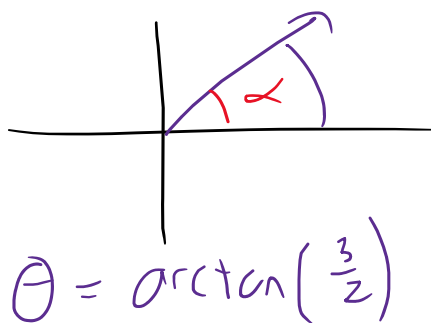
$$\alpha = \arcsin\left(\frac{1}{4}\right)$$



C) Solve over the interval

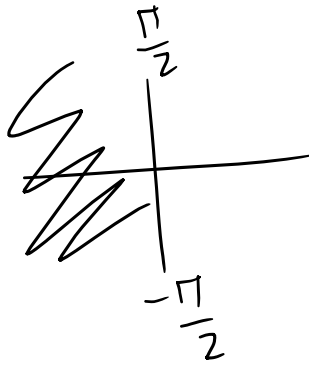
$$\alpha' = \arctan\left(\frac{3}{2}\right)$$

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

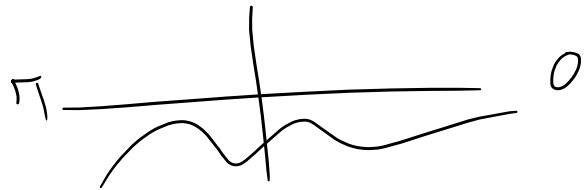


$$-\frac{\pi}{2}$$

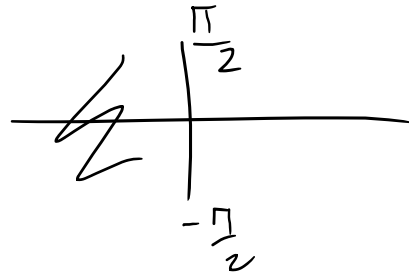
$\arcsin(x)$



$\arccos(x)$



$\arctan(x)$



Example 1

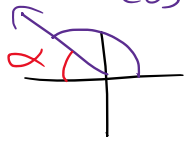
Let $f(\theta) = 3 \cos \theta + 2$. Over the interval $0 \leq \theta \leq 2\pi$, where is $f(\theta)$ positive?

$$3 \cos \theta + 2 > 0$$

$$3 \cos \theta + 2 = 0$$

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

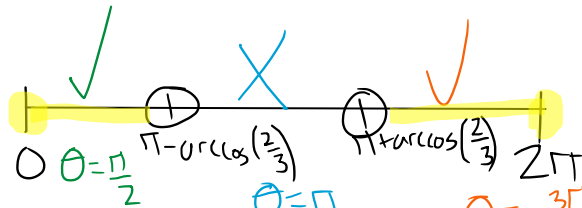
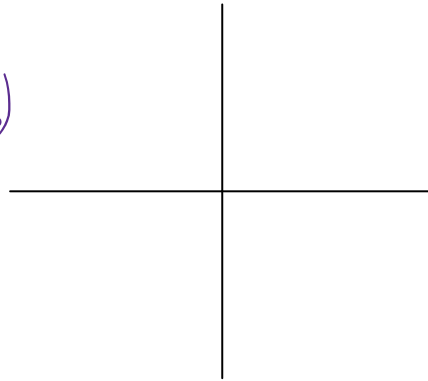
$$\alpha = \arccos\left(\frac{2}{3}\right)$$



$$\pi - \arccos\left(\frac{2}{3}\right)$$



$$\pi + \arccos\left(\frac{2}{3}\right)$$



$$\begin{aligned} 3 \cos\left(\frac{\pi}{2}\right) + 2 \\ 3 \cdot 0 + 2 \\ 2 \end{aligned}$$

$$\begin{aligned} 3 \cos(\pi) + 2 \\ 3 \cdot (-1) + 2 \\ -3 + 2 \\ -1 \end{aligned}$$

$$\begin{aligned} 3 \cos\left(\frac{3\pi}{2}\right) + 2 \\ 3 \cdot 0 + 2 \\ 2 \end{aligned}$$

$$\left[0, \pi - \arccos\left(\frac{2}{3}\right)\right) \cup \left(\pi + \arccos\left(\frac{2}{3}\right), 2\pi\right]$$

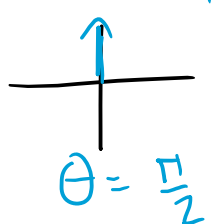
Strategy for All Inequality Problems

1. Move everything to one side and solve the equality
2. Put zeros on number line
3. Test regions

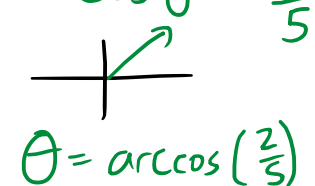
Example 2

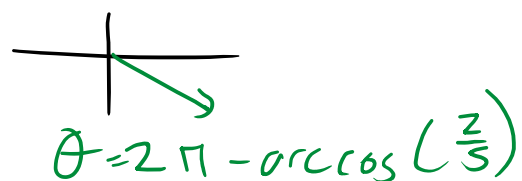
Let $f(\theta) = (\sin \theta - 1)(5 \cos \theta - 2) < 0$

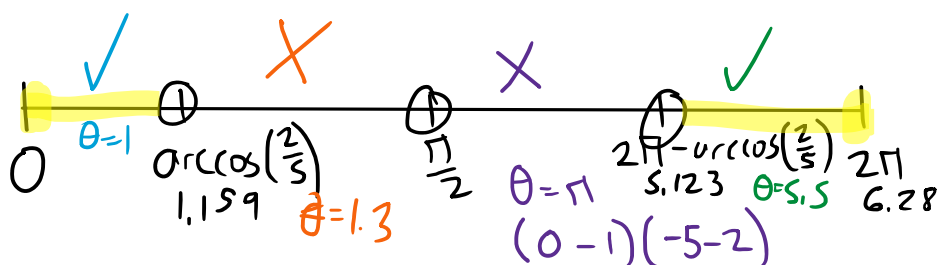
Over the interval $0 \leq \theta \leq 2\pi$, where is $f(\theta)$ negative?

$\sin \theta = 1$

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

$5 \cos \theta - 2 = 0$

$\cos \theta = \frac{2}{5}$

 $\theta = \arccos\left(\frac{2}{5}\right)$


 $\theta = 2\pi - \arccos\left(\frac{2}{5}\right)$



$\left[0, \arccos\left(\frac{2}{5}\right)\right) \cup \left(2\pi - \arccos\left(\frac{2}{5}\right), 2\pi\right]$

Example 3

Solve over the interval $0 \leq \theta \leq 2\pi$

$$3 \sin^2 \theta + 4 \sin \theta - 4 \geq 0$$

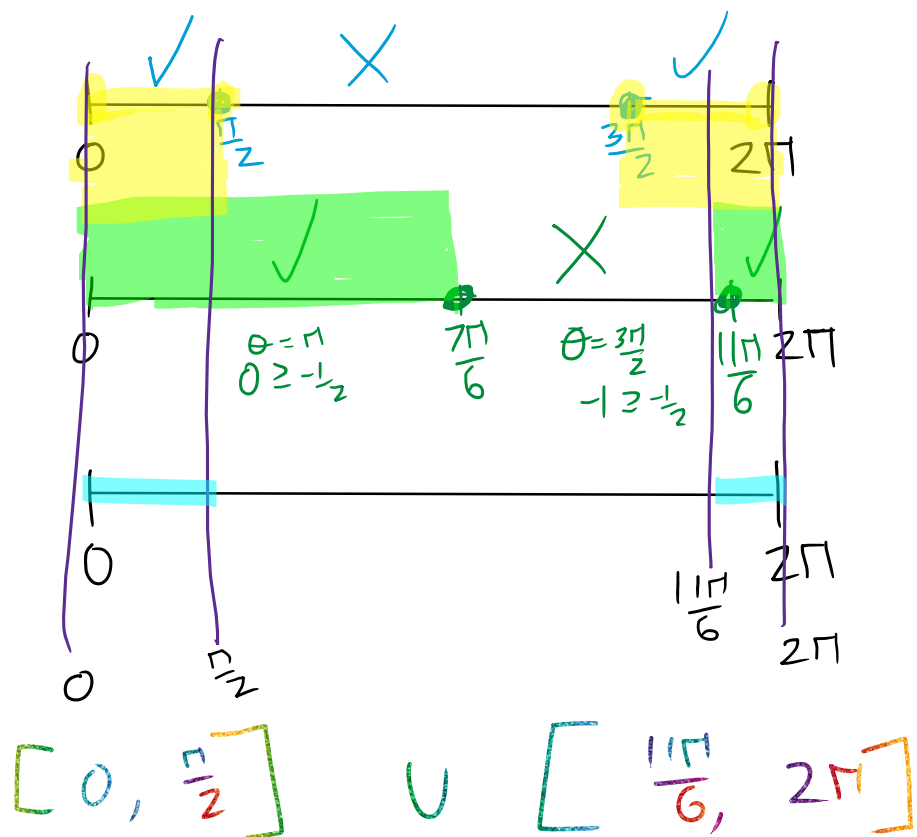
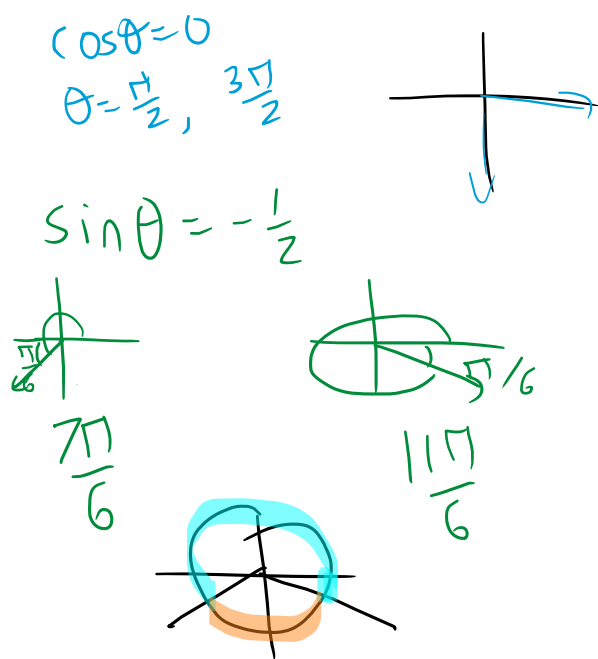
Example 4 (When we finish this question, remind me I want to check it a different way)

Solve over the interval $0 \leq \theta \leq 2\pi$

$$6 \sin^2 \theta + \cos \theta > 5$$

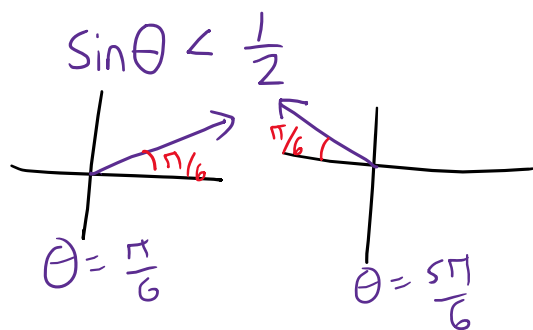
Example 5

What are all values of θ in $0 \leq \theta \leq 2\pi$ for which $\cos \theta \geq 0$ and $\sin \theta \geq -\frac{1}{2}$



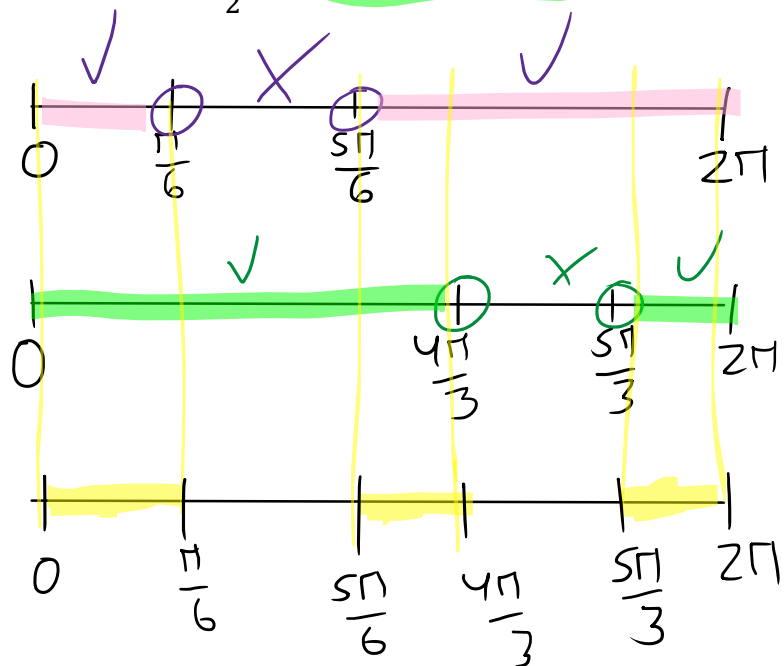
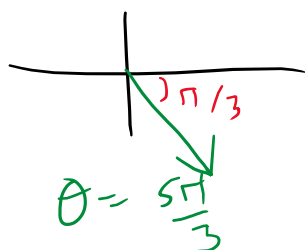
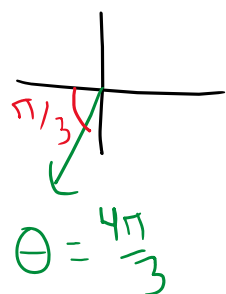
Example 6

What are all values of θ in $0 \leq \theta \leq 2\pi$ for which $\sin \theta < \frac{1}{2}$ and $-2 \sin \theta < \sqrt{3}$



$$-2 \sin \theta < \sqrt{3}$$

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



Example 7

Solve over the interval $0 \leq \theta \leq 2\pi$

$$(2 \sin \theta + 1)(\sin \theta + 2)(3 \sin \theta - 1) \geq 0$$

Example 8

Solve over the interval $0 \leq \theta \leq 2\pi$

$$9 \cos^2 \theta < 1$$

Example 9

Let $f(x) = 3 \sin \left(\frac{\pi}{8} (x - 1) \right) + 5$ for $0 \leq x \leq 15$

Use a graphing utility to analyze the graph of $y = f(x)$ to determine an interval over which $f(x) > 6$.