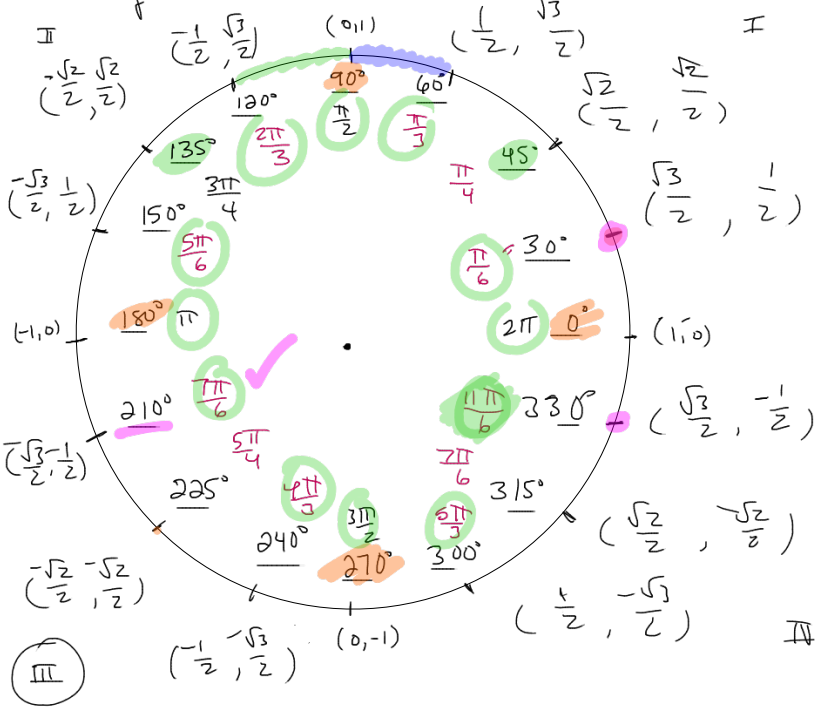
Monday Week 10

30 - 45 - 60



$30° \times \frac{\pi}{180°} = \frac{\pi}{6}$

rationalize

$\tan\left(\frac{11\pi}{6}\right) = \frac{\sin\frac{11\pi}{6}}{\cos\frac{11\pi}{6}} = \frac{-1/2}{\sqrt{3}/2} = \frac{-1}{\sqrt{3}} = \frac{-\sqrt{3}}{3}$

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

what y-coord $= \frac{\sqrt{3}}{2}$

$\csc\left(\frac{7\pi}{6}\right)$

$\frac{1}{\sin\left(\frac{7\pi}{6}\right)} = \frac{1}{-1/2} = 1\left(\frac{-2}{1}\right) = -2$

$\tan^{-1}(1) = \frac{\pi}{4}$

(where $\frac{\sin\theta}{\cos\theta} = 1$)

$\cot\theta = \frac{1}{\tan\theta} = \frac{1}{\left(\frac{\sin\theta}{\cos\theta}\right)} = \frac{\cos\theta}{\sin\theta}$

1 eats angles

$\tan^{-1}x = \arctan(x)$

(the angle θ whose $\tan\theta = x$

eats slopes

"the negative 1 gets used in two different contexts."

Functions: $f(x) = \frac{3}{x-1}$, $f^{-1}(x) = \frac{3+x}{x}$

$y = \frac{3}{x-1}$, $x = \frac{3}{y-1}$

$x(y-1) = 3$

$xy - x = 3$

$y = \frac{3+x}{x}$

Real #'s

3, x $\quad 3^{-1} = \frac{1}{3}$

$x^{-1} = \frac{1}{x}$

Mixing trig and inverse trig functions

Single Case: Evaluate $\sin\left(\sin^{-1}\left(\pi/2\right)\right) = \frac{\pi}{2}$

these match (∴ they cancel)

General Case: Evaluate $\sin\left(\tan^{-1}(x)\right)$

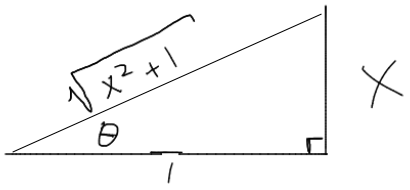
step1: understand what $\tan^{-1}(x)$ means (in terms triangles)
... where (an angle) tangent $= x$

Trig Formulas For Δ's

$\sin\theta = \frac{opp}{hyp}$	$\cos\theta = \frac{adj}{hyp}$	$\tan\theta = \frac{opp}{adj}$	$\sec\theta = \frac{hyp}{adj}$	$\csc\theta = \frac{hyp}{opp}$
$\cot\theta = \frac{adj}{opp}$				

SOHCAHTOA

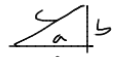
step2



you choose side so that $\tan\theta = x$

$\frac{opp}{adj} = \tan\theta = x$

step3 use Pythas. thm to find the remaining side.



$c^2 = a^2 + b^2$
$c^2 = 1 + x^2$

step4 $\sin\left(\tan^{-1}x\right) \overset{\text{From step 2}}{=} \sin(\theta) = \frac{opp}{hyp} = \frac{x}{\sqrt{x^2+1}}$

look @ Δ

Ex

$$\sec(\sin^{-1}(x)) =$$

step 1: what does $\sin^{-1}x$ mean?

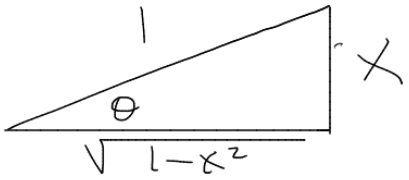
set: $\sin^{-1}(x) = \theta$ whose $\sin(\theta) = x$.

an angle

$$\sin(\sin^{-1}x) = \sin\theta$$

$$x = \sin\theta$$

step 2 Make $\triangle$



step 3 $1^2 = x^2 + a^2$ so $a^2 = 1 - x^2$

$a = \sqrt{1-x^2}$

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

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

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

$$2(\sin^2 x) + 4\cos x + 1 = 0$$

$$2(1 - \cos^2 x) + 4\cos x + 1 = 0$$

$$2 - 2\cos^2 x + 4\cos x + 1 =$$

$$-2\cos^2 x + 4\cos x + 3 = 0$$