<u>Assignments for the Week of Oct. 3</u>

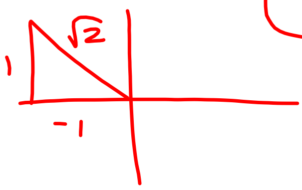
- Read 6.5, 6.6
- 45 minutes of Khan Academy
- Textbook assignment due Test Day:
  <u>6.3</u> #1-24 all; 30-36 all; 49-93 odd
- **TEST #3**
  9:00 class - Tues. 10/4
  8:00 class - Wed. 10/5

Coming up after the test:

- 6.5 #1-24 all, #25-55 odd   Inverse Trig Functions
- 6.6 Solving Trig Equations

$$\cos\frac{27\pi}{4} = \cos\frac{3\pi}{4} = \frac{-1}{\sqrt{2}} = \boxed{-\frac{\sqrt{2}}{2}}$$

$$\frac{27\pi}{4} - 3\cdot\frac{8\pi}{4} = \frac{3\pi}{4}$$



$\tan 15° = \tan(45° - 30°)$

$$= \frac{\tan 45° - \tan 30°}{1 + \tan 45° \tan 30°}$$

$$= \frac{1 - \frac{\sqrt{3}}{3}}{1 + 1 \cdot \frac{\sqrt{3}}{3}} = \frac{\frac{3-\sqrt{3}}{3}}{\frac{3+\sqrt{3}}{3}} = \frac{3-\sqrt{3}}{\cancel{3}} \cdot \frac{\cancel{3}}{3+\sqrt{3}}$$

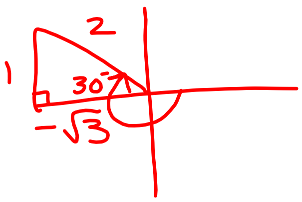
$$= \frac{3-\sqrt{3}}{3+\sqrt{3}} \cdot \frac{3-\sqrt{3}}{3-\sqrt{3}} = \frac{9 - 6\sqrt{3} + 3}{9 - 3} =$$

$$= \frac{12 - 6\sqrt{3}}{6} = \frac{\cancel{6}(2-\sqrt{3})}{\cancel{6}} = \boxed{2-\sqrt{3}}$$

$$\tan 15° = \tan\frac{30°}{2} = \frac{1 - \cos 30°}{\sin 30°} =$$

$$= \frac{1 - \frac{\sqrt{3}}{2}}{\frac{1}{2}} = \left(1 - \frac{\sqrt{3}}{2}\right) \cdot \frac{2}{1} = \boxed{2 - \sqrt{3}}$$

$\sec\left(-\frac{7\pi}{6}\right) = -\frac{2}{\sqrt{3}} = \boxed{\frac{-2\sqrt{3}}{3}}$



$$\sec\frac{-7\pi}{6} = \sec\frac{7\pi}{6} = \frac{1}{\cos\frac{7\pi}{6}} = \frac{1}{-\frac{\sqrt{3}}{2}} = \frac{-2}{\sqrt{3}} \ldots$$

$$\sin 15^\circ = \sin\frac{30^\circ}{2} = +\sqrt{\frac{1-\cos 30^\circ}{2}}$$

$$= \sqrt{\frac{1-\frac{\sqrt{3}}{2}}{2}} = \sqrt{\frac{\frac{2-\sqrt{3}}{2}}{\frac{2}{1}}}$$

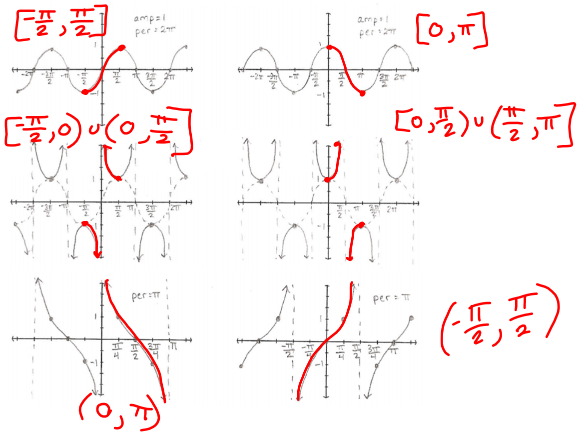
$$= \sqrt{\frac{2-\sqrt{3}}{2}\cdot\frac{1}{2}} = \frac{\sqrt{2-\sqrt{3}}}{\sqrt{4}} = \boxed{\frac{\sqrt{2-\sqrt{3}}}{2}}$$

$$\tan 2x = \frac{2\sin x\cos x}{\cos^2 x - \sin^2 x}$$

$$LHS = \tan 2x = \frac{\sin 2x}{\cos 2x} = \frac{2\sin x\cos x}{\cos^2 x - \sin^2 x}$$

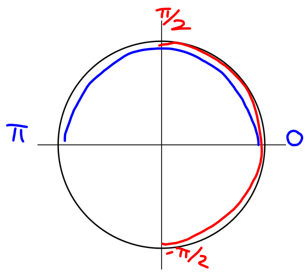
$$= RHS$$

But Trigonometric functions aren't one-to-one – how is the inverse defined? We must restrict the domain!



Summary of Restricted Domains:

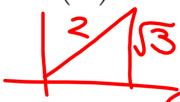
Interval	Functions	Quadrants
$\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$	$\sin x, \csc x, \tan x$	IV & I
$(0, \pi)$	$\cos x, \sec x, \cot x$	I & II



Evaluate.

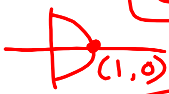
$\cot^{-1}\left(-\frac{1}{\sqrt{3}}\right) =$ 120° $\boxed{\frac{2\pi}{3}}$

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

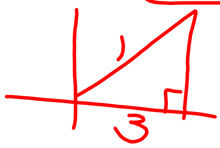


$\csc^{-1}(-2) = \boxed{\frac{-\pi}{6}}$

$\tan^{-1}(0) = \boxed{0}$



$\cos^{-1}(3) =$ undefined

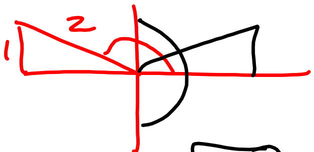


What happens when we compose a Trigonometric function with its inverse?

According to the definition,

$f(x)$ and $g(x)$ are inverses if $f(g(x)) = x$ and $g(f(x)) = x$

(for all x-values in the respective domains of g and f)



We would then expect

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

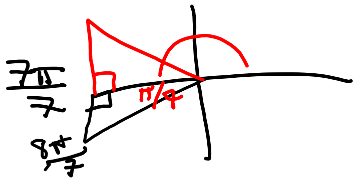
$\sin\left(\sin^{-1}\frac{1}{2}\right) = \boxed{\frac{1}{2}}$

$\sin^{-1}\left(\sin\left(\frac{5\pi}{6}\right)\right) = \sin^{-1}\left(\frac{1}{2}\right) = \boxed{\frac{\pi}{6}}$

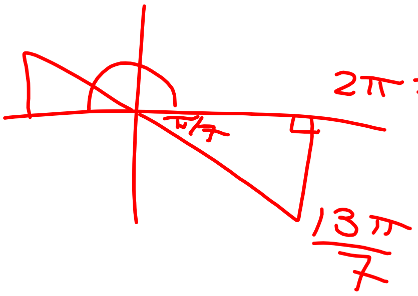
$\sin^{-1}\left(\sin\left(-\frac{\pi}{6}\right)\right) = \boxed{\frac{-\pi}{6}}$

$\cos^{-1}\left(\cos\left(\frac{8\pi}{7}\right)\right) = \boxed{\frac{6\pi}{7}}$

$\sin(\sin^{-1} 3) =$ undefined



$$\cot^{-1}\left(\cot\frac{13\pi}{7}\right) = \boxed{\frac{6\pi}{7}}$$



$2\pi = \frac{14\pi}{7}$

Evaluate:

$\cos^{-1}\left(\cos\left(\frac{12\pi}{7}\right)\right) = \boxed{\frac{2\pi}{7}}$

$\tan^{-1}\left(\tan\left(\frac{4\pi}{5}\right)\right) = \boxed{-\frac{\pi}{5}}$

$\sec^{-1}\left(\sec\left(-\frac{4\pi}{5}\right)\right) = \boxed{\frac{4\pi}{5}}$