6.2 #1-41 odd - due Mon. 01/09

6.1 #1-69 odd (proofs) - due Tues. 01/17

Due Mon. 01/23:

- 6.3 #1-24 all; 30-36 all; 49-93 odd Double & Half-angle Identities
- 6.5 #1-24 all ; #25-55 odd Inverse Trig Functions

Test #3 - Tues. 01/24 (6.1, 6.2, 6.3, 6.5)

Upcoming: Solving Trig Equations

- 6.6 #1-21 odd finding solutions between 0 and 2pi
  #61-69 odd finding all possible solutions (+2pi*k)
  #71-83 odd

$1 + 4/2$

$(1+4)/2$

1. $LHS = \sin(a-b) - \sin(a+b)$

$= \sin a\cos b - \cos a\sin b - (\sin a\cos b + \cos a\sin b) =$

$= \sin a\cos b - \cos a\sin b - \sin a\cos b - \cos a\sin b =$

$= -2\cos a\sin b = RHS$

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

$LHS = \frac{\cancel{2}(\cos^2 x - \sin^2 x)}{\cancel{2}\sin x\cos x} = \frac{\cos^2 x}{\sin x\cos x} - \frac{\sin^2 x}{\sin x\cos x} =$

$= \frac{\cos x\cancel{\cos x}}{\sin x\cancel{\cos x}} - \frac{\cancel{\sin x}\sin x}{\cancel{\sin x}\cos x} = \cot x - \tan x = RHS$

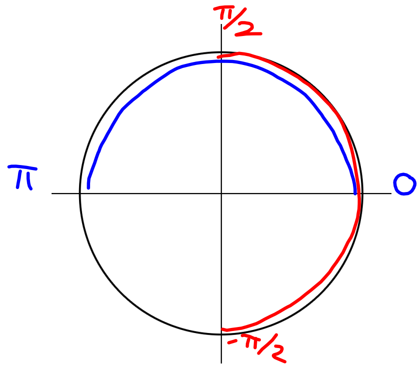
$RHS = \frac{\cos x}{\sin x} - \frac{\sin x}{\cos x} = \frac{\cos x}{\sin x}\cdot\frac{\cos x}{\cos x} - \frac{\sin x}{\cos x}\cdot\frac{\sin x}{\sin x}$

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

$= \frac{2(\cos^2 x - \sin^2 x)}{2\cdot\sin x\cos x} = \frac{2\cos 2x}{\sin 2x} = LHS$ ✓

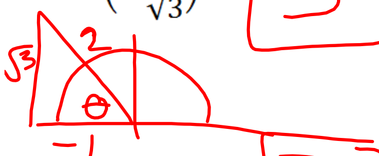
Summary of Restricted Domains:

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

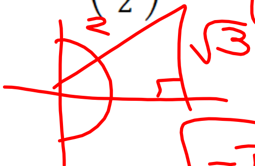


Evaluate.

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

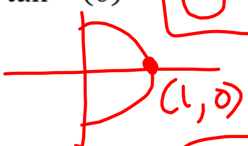


$\sin^{-1}\left(\frac{\sqrt{3}}{2}\right) = \boxed{\frac{\pi}{3}}$



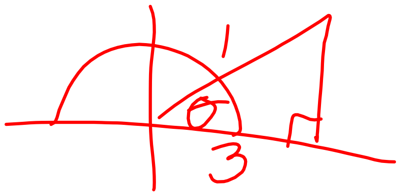
$\csc^{-1}(-2) = \boxed{-\frac{\pi}{6}}$

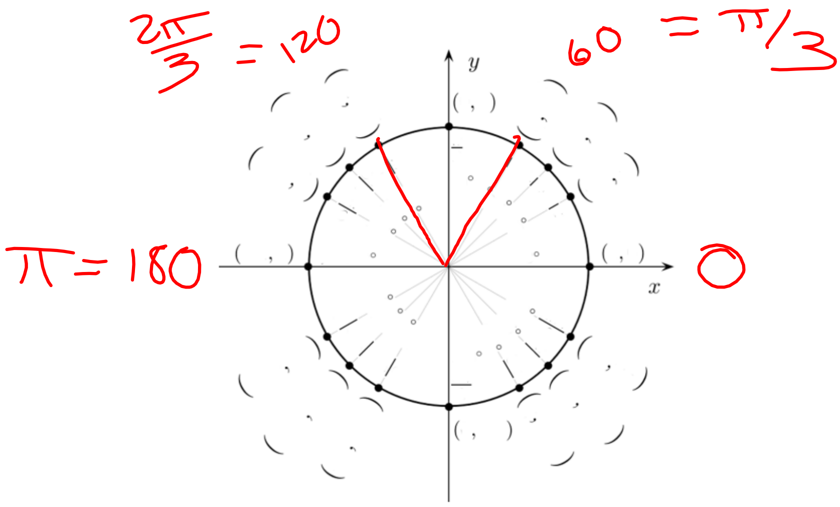
$\tan^{-1}(0) = \boxed{0}$



$\tan 0 = \frac{0}{1} = 0$

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





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

According to the definition,

$f(x)$ and $g(x)$ are inverses if $f\big(g(x)\big) = x$ and $g\big(f(x)\big) = x$
(for all x-values in the respective domains of g and f)

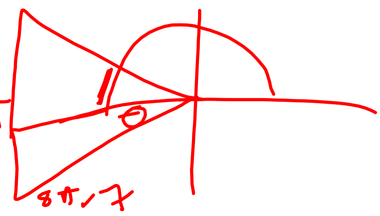
We would then expect

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

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

$\sin^{-1}\left(\sin\left(-\frac{\pi}{6}\right)\right) = \sin^{-1}\left(\frac{-1}{2}\right) = \boxed{\frac{-\pi}{6}}$ $\cos^{-1}\left(\cos\left(\frac{8\pi}{7}\right)\right) = \boxed{\frac{6\pi}{7}}$

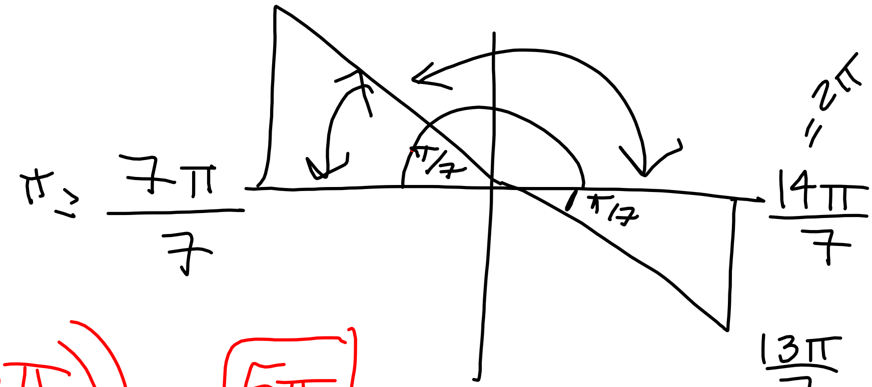
$\frac{7\pi}{7} = \pi$



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

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

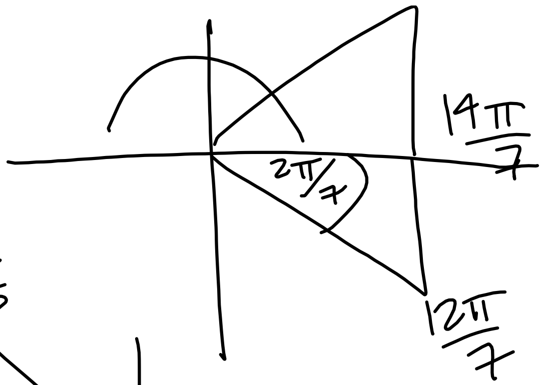
$$=\boxed{\frac{6\pi}{7}}$$



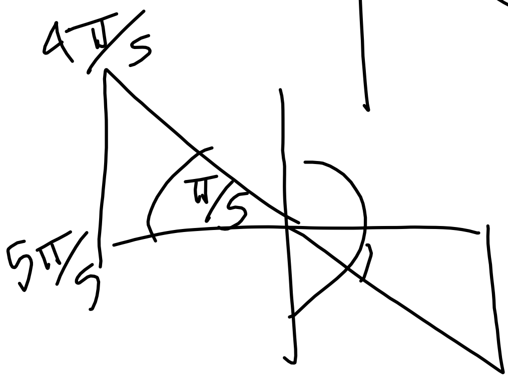
$$\cot^{-1}\left(\cot\frac{5\pi}{7}\right)=\boxed{\frac{5\pi}{7}}$$

Evaluate:

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



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



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