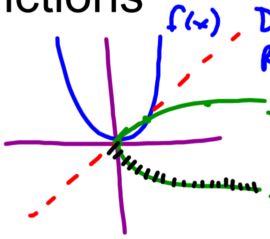
4.7 Inverse Trig Functions

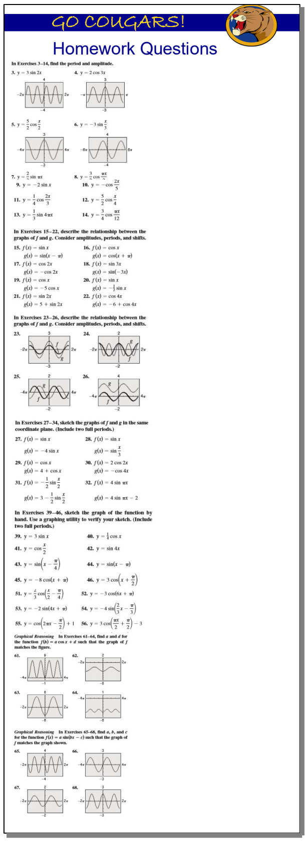
- Graphs of inverse trig functions
- Ranges of inverse trig functions
- Evaluating
- Compositions



$Df(x)=(-\infty,\infty)$
$R\,f(x)=[0,\infty)$

$Df^{-1}(x)=[0,\infty)$
$Rf^{-1}(x)=[0,\infty)$

Feb 13-9:27 AM

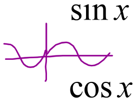
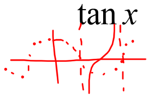


GO COUGARS!

Homework Questions

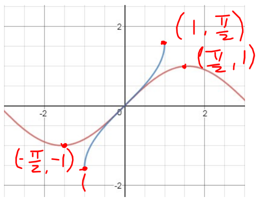
Feb 2-9:51 PM

Let's review the domains and ranges of the six trig functions we are familiar with.

	domain	range
$\sin x$ 	$(-\infty,\infty)$	$[-1,1]$
$\cos x$ 	$(-\infty,\infty)$	$[-1,1]$
$\tan x$ 	$(-\infty,\infty)$ $x\neq \frac{k\pi}{2}$ k is an odd integer	$(-\infty,\infty)$
$\csc x$ 	$(-\infty,\infty)$ $x\neq k\pi$ k is an integer	$(-\infty,-1]$ $[1,\infty)$
$\sec x$ 	$(-\infty,\infty)$ $x\neq \frac{k\pi}{2}$ k is an odd integer	$(-\infty,-1]$ $[1,\infty)$
$\cot x$ 	$(-\infty,\infty)$ $x\neq k\pi$ K is an integer	$(-\infty,\infty)$

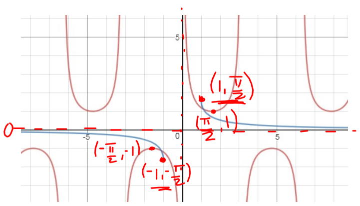
Feb 21-7:02 AM

$\sin^{-1}\theta$



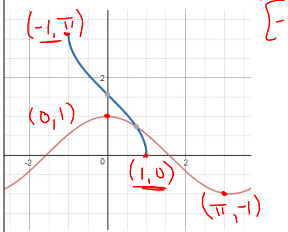
Domain	Range
$[-1,1]$	$[-\frac{\pi}{2},\frac{\pi}{2}]$

$\csc^{-1}\theta$



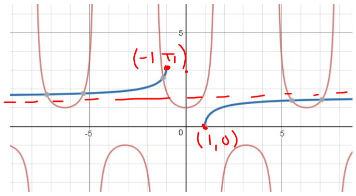
Domain	Range
$(-\infty,-1]$ $[1,\infty)$	$(-\frac{\pi}{2},\frac{\pi}{2})$ $x\neq 0$

$\cos^{-1}\theta$



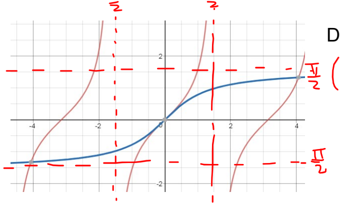
Domain	Range
$[-1,1]$	$[0,\pi]$

$\sec^{-1}\theta$



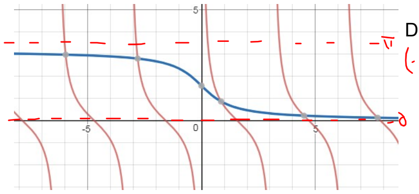
Domain	Range
$(-\infty,-1]$ $[1,\infty)$	$[0,\pi]$ $x\neq\frac{\pi}{2}$

$\tan^{-1}\theta$



Domain	Range
$(-\infty,\infty)$	$(-\frac{\pi}{2},\frac{\pi}{2})$

$\cot^{-1}\theta$



Domain	Range
$(-\infty,\infty)$	$(0,\pi)$

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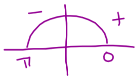
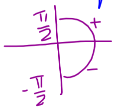


summary — Memorize the ranges!



$\cos^{-1} x$ $[0, \pi]$

$\sin^{-1} x$ $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$

$\cot^{-1} x$ $(0, \pi)$

$\tan^{-1} x$ $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$

$\sec^{-1} x$ $[0, \pi]$ $x \neq \frac{\pi}{2}$

$\csc^{-1} x$ $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$ $x \neq 0$

Feb 22-7:58 AM

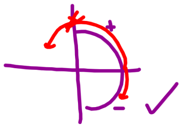
$\sin^{-1}\theta$ *means the same as* $\arcsin\theta$

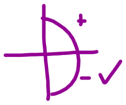
$\sin^{-1}\theta$ *and* $\arcsin\theta$ are kinda like $\sin\theta = x$ 2 solutions
1 solution
but with the restrictions imposed by the inverse function

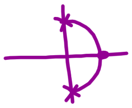
Evaluate the inverse function use radians!

$\arcsin\left(-\frac{1}{\sqrt{2}}\right)$ $\cos^{-1}\left(\frac{\sqrt{3}}{2}\right)$ $\tan^{-1}\left(-\sqrt{3}\right)$ $\arctan(0)$ $= 0$ arccos(3)

ratio angle







$-\frac{\pi}{4}$ $\frac{\pi}{6}$ $-\frac{\pi}{3}$ no solution 3 not in domain

Feb 13-9:28 AM

Compositions

$\tan\left(\underbrace{\arctan\left(\frac{1}{\sqrt{3}}\right)}\right)$

$\tan\left(\frac{\pi}{6}\right)$

$\frac{1}{\sqrt{3}}$

$\arccos(\cos\pi)$

$\arccos(-1)$

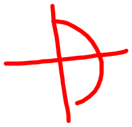
π

Feb 13-9:35 AM

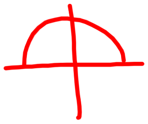
BUT....

$\arcsin\left(\sin\left(\overset{QII}{\frac{5\pi}{6}}\right)\right)$

$\arcsin\left(\frac{1}{2}\right)=\frac{\pi}{6}$

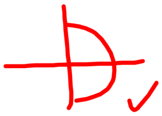


$\arccos\left(\cos\overset{II}{\frac{5\pi}{6}}\right)$



$\frac{5\pi}{6}$

$\cos(\arctan(-1))$

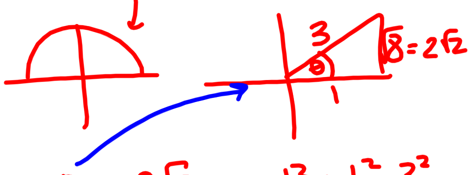


$\cos\left(-\frac{\pi}{4}\right)=\frac{1}{\sqrt{2}}$

Feb 13-9:36 AM

If the value is not a common ratio:

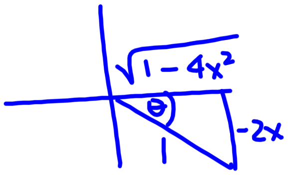
$\tan\left(\arccos\left(\frac{1}{3}\right)\right)$ $\cos\theta = \frac{1}{3}$



$\tan\theta = 2\sqrt{2}$ $1^2 + b^2 = 3^2$

$\cot(\arcsin(-2x)) = \frac{\sqrt{1-4x^2}}{-2x}$

$x \neq 0$



$1^2 = (-2x)^2 + b^2$
$1^2 = 4x^2 + b^2$

Feb 13-9:37 AM

HOMEWORK

p 327 1-9 odd, 27-60 by 3's

Workbook p 109-110

Feb 2-9:51 PM