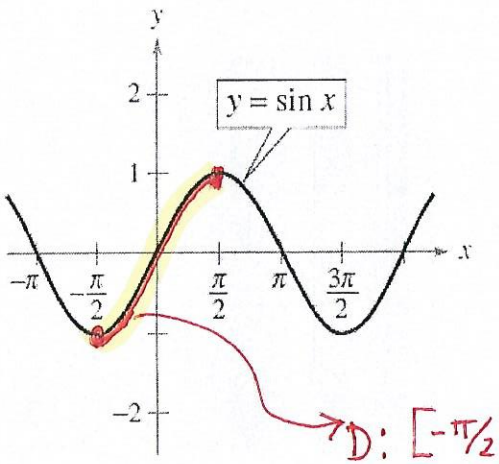
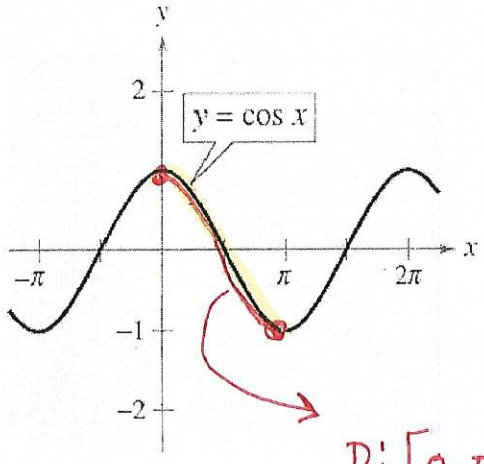


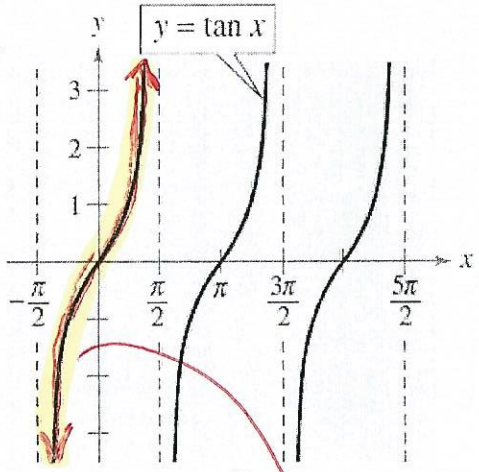
D: $[-\pi/2, \pi/2]$
R: $[-1, 1]$

DOMAIN: $(-\infty, \infty)$
RANGE: $[-1, 1]$
PERIOD: 2π



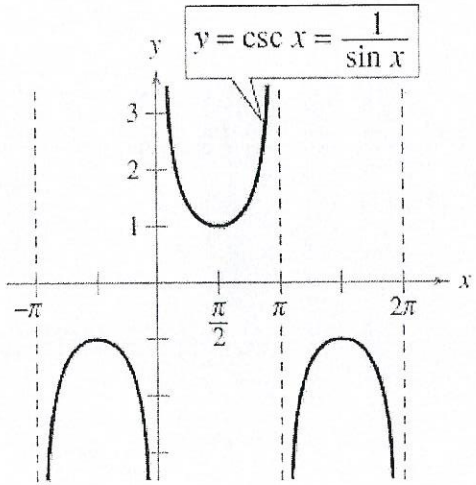
D: $[0, \pi]$
R: $[-1, 1]$

DOMAIN: $(-\infty, \infty)$
RANGE: $[-1, 1]$
PERIOD: 2π

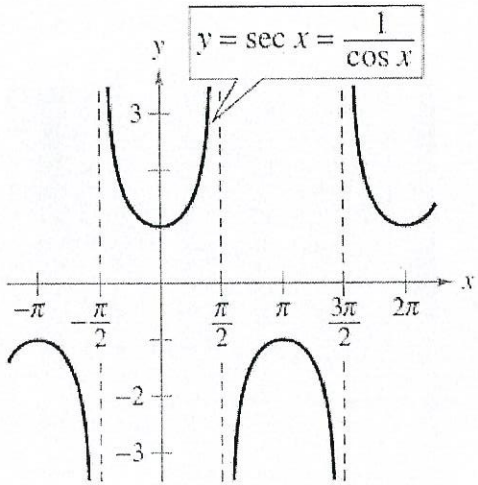


D: $(\frac{-\pi}{2}, \frac{\pi}{2})$
R: $(-\infty, \infty)$

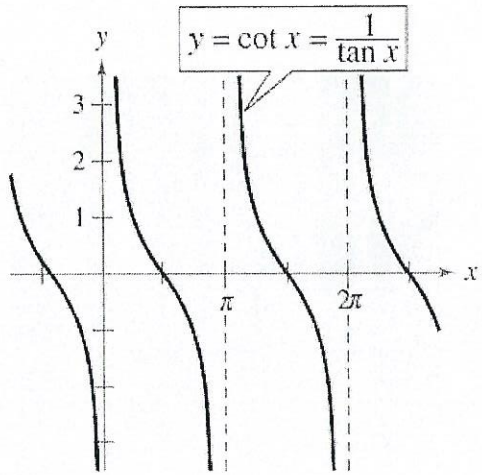
DOMAIN: ALL $x \neq \frac{\pi}{2} + n\pi$
RANGE: $(-\infty, \infty)$
PERIOD: π



DOMAIN: ALL $x \neq n\pi$
RANGE: $(-\infty, -1] \cup [1, \infty)$
PERIOD: 2π



DOMAIN: ALL $x \neq \frac{\pi}{2} + n\pi$
RANGE: $(-\infty, -1] \cup [1, \infty)$
PERIOD: 2π



DOMAIN: ALL $x \neq n\pi$
RANGE: $(-\infty, \infty)$
PERIOD: π

Precal Name: _____

Notes 4.7---Inverse Trigonometric Functions

Recall from section 1.4 that a function will only have an inverse that is a function given that it is one-to-one and since we know what the graphs of sine, cosine, and tangent look like, it is clear that they are not one-to-one. However, if you restrict the domain of $y = \sin(x)$ to the interval $[-\pi/2, \pi/2]$ then the restricted function IS one-to-one! **The inverse sine function is the inverse of the restricted portion of the sine function.**

THE ARCSINE FUNCTION 1st/4th* quad

DEFINITION------The unique angle y in the interval $[-\pi/2, \pi/2]$ such that-- $\sin(y) = x$ -- is the inverse sine (or arcsine) of x. Denoted $\sin^{-1}x$ or $\arcsin x$. The domain of $y = \sin^{-1}x$ is [-1, 1] and the range is $[-\pi/2, \pi/2]$ $[-1.57, 1.57]$

Ex1) Find the exact value of each expression without a calculator:

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

(b) $\sin^{-1}\left(-\frac{\sqrt{3}}{2}\right)$ $-\frac{\pi}{3}$ $\sin^{-1}\left(-\frac{\sqrt{2}}{2}\right) = -\frac{\pi}{4}$

(c) $\sin^{-1}\left(\frac{\pi}{2}\right)$ 1.57 not valid domain [-1,1] undefined

(d) $\sin^{-1}\left(\sin\frac{\pi}{9}\right)$ 1st quad pos ratio $\frac{\pi}{9}$

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

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

Ex2) Use a calculator to evaluate the following values:

(a) $\sin^{-1}(-0.81) = -.944$ 1st/2nd quad

(b) $\sin^{-1}(\sin(3.49\pi)) = -1.539$ 1st/4th* quad

*What mode should be used? radian

*How do you know? range is $[-\pi/2, \pi/2]$ radians

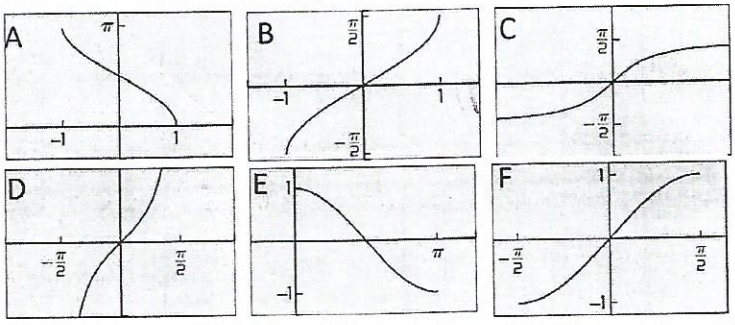
THE ARCCOSINE & ARCTANGENT FUNCTIONS

DEFINITION------The unique angle y in the interval $[0, \pi]$ such that--cos (y) = x--is the inverse cosine (or arccosine) of x. Denoted $\cos^{-1}x$ or $\arccos x$. The domain of $y = \cos^{-1}x$ is [-1, 1] and the range is $[0, \pi]$

DEFINITION------The unique angle y in the interval $(-\pi/2, \pi/2)$ such that--tan(y)=x-- is the inverse tangent (or arctangent) of x. Denoted $\tan^{-1}x$ or $\arctan x$. The domain of $y = \tan^{-1}x$ is $(-\infty, \infty)$ and the range is $(-\pi/2, \pi/2)$

**********Which is Which?**********

1) $y = \sin x$ F
2) $y = \cos x$ E
3) $y = \tan x$ D
4) $y = \arcsin x$ B
5) $y =$ ~~arcos x~~ $\arccos x$ A
6) $y = \arctan x$ C

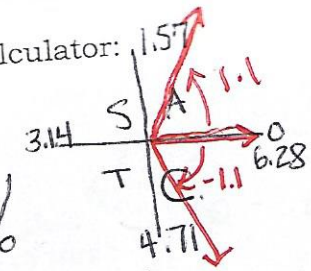


Ex3) Find the exact value of the following expressions without a calculator:

(a) $\cos^{-1}\left(-\frac{\sqrt{2}}{2}\right)$ $\frac{3\pi}{4}$

(b) $\tan^{-1}\left(\sqrt{3}\right)$ $\frac{\pi}{3}$

(c) $\cos^{-1}(\cos(-1.1))$ 4th quad, pos ratio, $|1.1|$

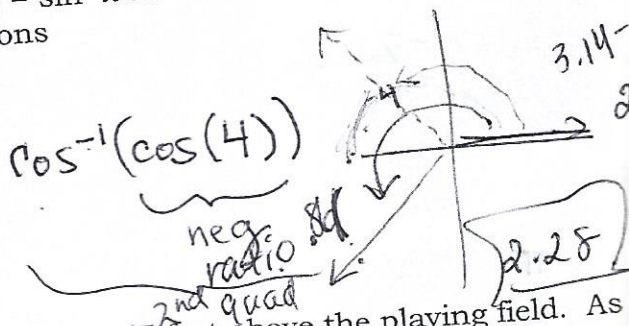


$\tan^{-1}(-1) = -\frac{\pi}{4}$

$\cos^{-1}\left(\cos\left(\frac{11\pi}{6}\right)\right)$

$= \cos^{-1}\left(\frac{\sqrt{3}}{2}\right) = \frac{\pi}{6}$

Ex4) Compose each of the six basic trig functions with $f(x) = \sin^{-1}x$ and reduce the composite function to an algebraic expression involving no trig functions



$\cos^{-1}(\cos(4))$

neg ratio, 2nd quad

Ex5) The bottom of a 20-foot replay screen at Dodger Stadium is 45 feet above the playing field. As you move away from the wall, the angle formed by the screen at your eye (from the top of the screen to your eye, and back from your eye to the bottom of the screen) changes. There is a distance from the wall at which the angle is greatest. What is that distance?

******This is a calculator based question******