Schedule stuff - This week: 1.6 - 1.8.

WebAssign Test 1: Deadline is Wednesday, February 14th.

Make sure you install the Lockdown Browser:

https://harryzaims.com/public_html/121-online/videos/00-Orientation/Lockdown-Browser.mp4

How to request a homework extension on WebAssign

https://harryzaims.com/public_html/121-online/videos/00-Orientation/Extensions.mp4

Grade Reports - Interim reports delivered to your e-mail. Three categories for the overall average:

Before Test 1 (Homework and Writing Project #0)

After Test 1 (Homework, Writing Projects, and WebAssign Tests)

After Midterm (Homework, Writing Projects, Orientation Tasks, Written Tests)

The reason for the confusion over two versus three was that right *now*, you're only being assessed over Homework and Writing Project #0. That's two categories.

But for reading your grade off your grade report, there are *three* columns, the three listed, above.

You're going to have two WebAssign tests before you take the written midterm. Before the midterm, after Test 1, there's only WebAssign Homework, Tests, Writing Project #0.

AFTER the midterm, you'll have all the categories counted.

1. WebAssign Homework.

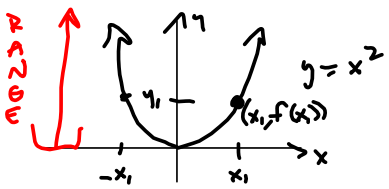
2. WebAssign Tests

3. Writing Projects

4. Written Tests (Midterm and Final)

5. Orientation Tasks. (Primarily your e-mail settings and using your D2L e-mail tool for class-related communications with me. Obviously being registered on WebAssign is included.)

Function - A function is a rule that assigns to each *x* in one set (called the "domain") exactly one *y* in a second set (called the "range.")



Domain = $D = \mathbb{R} = (-\infty, \infty)$

Range = $R = [0, \infty) = \{x \mid x \geq 0\}^*$

$\{y \mid y \geq 0\}$ is better for clarity.

*set-builder

1-to-1 Function - Each *y* in the range corresponds to exactly one *x* in the domain.

$f(x) = x^2$ is not 1-to-1:

Note $f(x_1) = f(-x_1) = y_1$!

$x_1^2 = (-x_1)^2$

We need 1-to-1 for there to be an inverse relation that is a function!

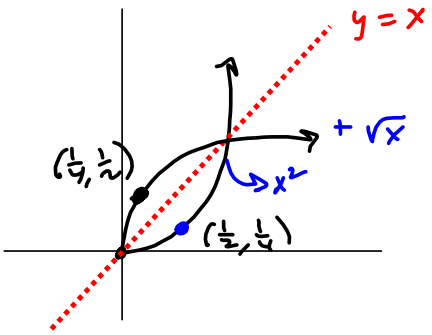
We're not gonna let that stop us from solving

$x^2 = 7$

$\Rightarrow x = \pm\sqrt{7}$

Restricted Domains - We can restrict the domain to an appropriate set to MAKE it 1--to-1.

Restrict *x* to the half-open interval $[0, \infty)$



If $x \geq 0$, then

$x^2 = 7$ means

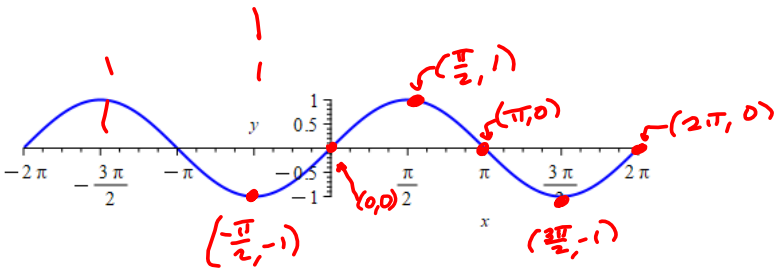
$x = \sqrt{7}$

$\Leftarrow f^{-1}(x) = \sqrt{x}$

$\pm\sqrt{x}$ isn't a function!

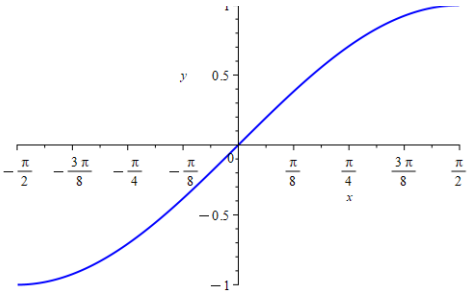
Graph of sine and arcsine.

$f(x) = \sin(x) \Rightarrow f^{-1}(x) = \arcsin(x) = \sin^{-1}$ on your scientific calculator

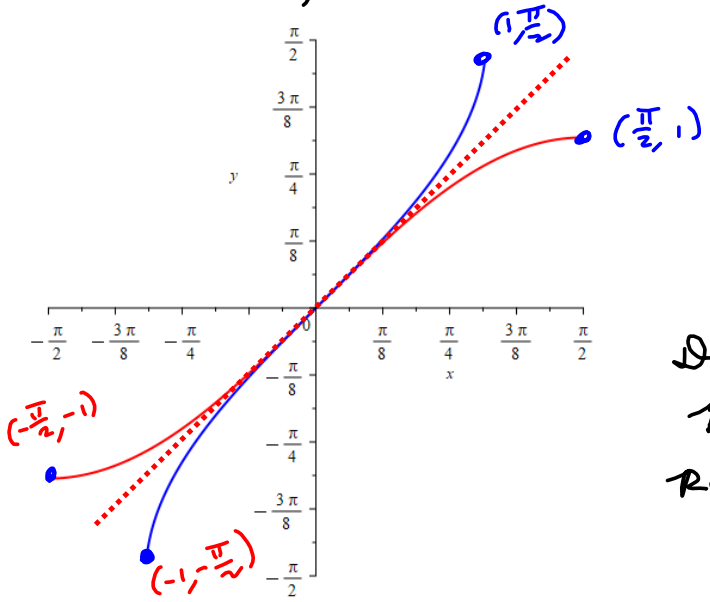


Restricted sign to $[-\frac{\pi}{2}, \frac{\pi}{2}]$

sine!



Graph of f^{-1} is the reflection of the graph of $f(x)$ thru the line $y = x$.



$\mathcal{D}(f^{-1}) = \mathcal{R}(f)$

$\mathcal{R}(f^{-1}) = \mathcal{D}(f)$

$\mathcal{D}(f) = [-\frac{\pi}{2}, \frac{\pi}{2}]$

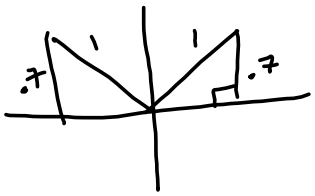
$\mathcal{R}(\arcsin(x)) = [-\frac{\pi}{2}, \frac{\pi}{2}]$

$\mathcal{R}(f) = [-1, 1] = \mathcal{D}(\arcsin(x))$

Find all solutions in $[0, 2\pi]$ of $\sin(x) = .7$

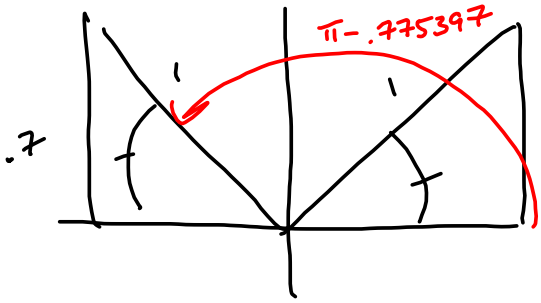
https://www.wolframalpha.com/input?i=arcsin%28.7%29

$\arcsin(.7) \approx 0.775397$ is only $\frac{1}{2}$ of the answer.



arcsine only sees the one in QI

You have to use that one to find the other one.

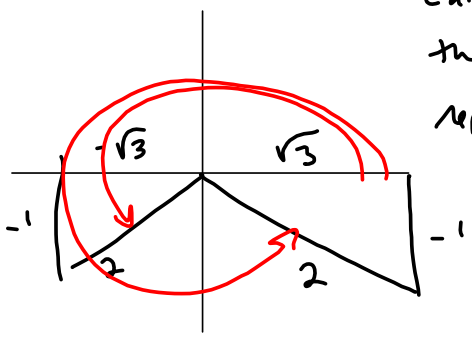


These are the same reference angle.
Express the one in QII

$\pi - .775397 \approx 2.36620$

So $x \approx .7754, 2.3662$; if we want 4 digits to the right of the decimal.

Solve sin(x) = -1/2



Calculator will only "see" the one in QIV & it will report it as a $-\frac{\pi}{6}$ or $-30°$.

MODE: Radians Degrees

on $[0,2\pi]$, this would be reported as

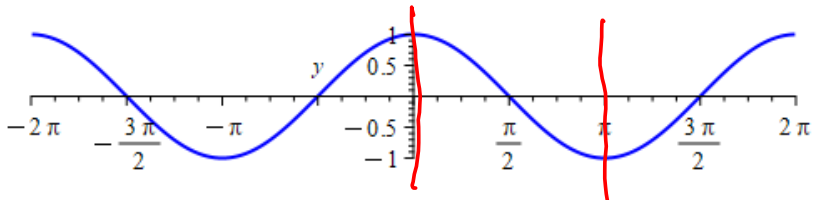
$\pi + \frac{\pi}{6}$ & $2\pi - \frac{\pi}{6}$

$\pi - \arcsin(-\frac{1}{2})$ $2\pi + \arcsin(-\frac{1}{2})$

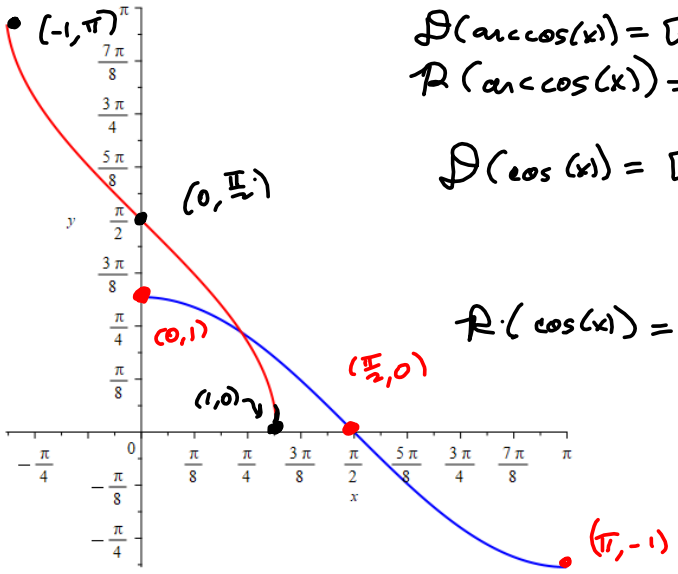
$\pi - \sin^{-1}(-\frac{1}{2})$

↳ seems weird, but arcsine was negative.

Graph cosine and arccosine



0 π Restriction.



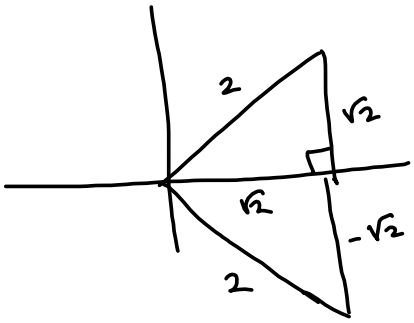
$D(\arccos(x)) = [-1, 1]$

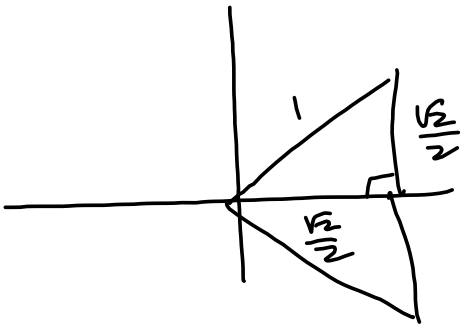
$R(\arccos(x)) = [0, \pi]$

$D(\cos(x)) = [0, \pi]$ was the restriction to make it 1-to-1.

$R(\cos(x)) = [-1, 1] = D(\arccos(x))$

Find all $x \in [0, 2\pi]$ such that $\cos(x) = \frac{\sqrt{2}}{2}$

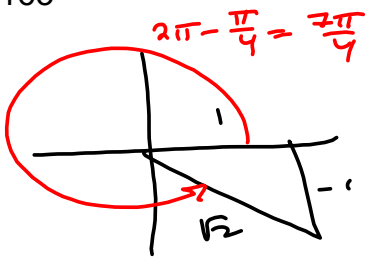




$\cos^{-1}(\sqrt{2}/2) = \frac{\pi}{4} \approx 0.785398163$

OR 45°

Wolfram Alpha is in radians.



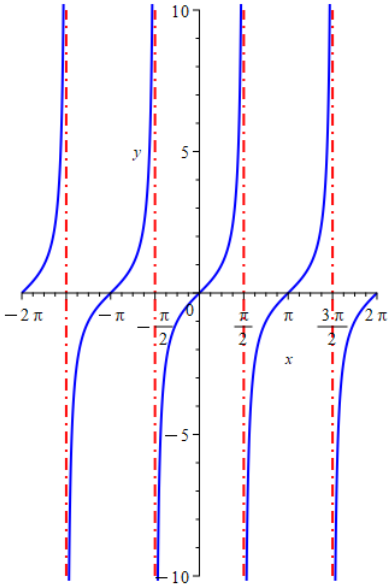
180/pi*0.785398163 $\approx 45^\circ$

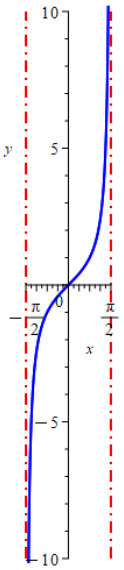
$\cos(x) = \frac{\sqrt{2}}{2} \Rightarrow x \in \left\{\frac{\pi}{4}, \frac{7\pi}{4}\right\}$ as a set.

$x = \frac{\pi}{4}, \frac{7\pi}{4}$ as a condition on x.

WebAssign likes

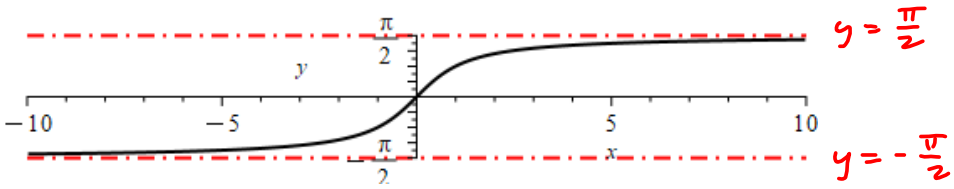
Graph of tangent and arctangent

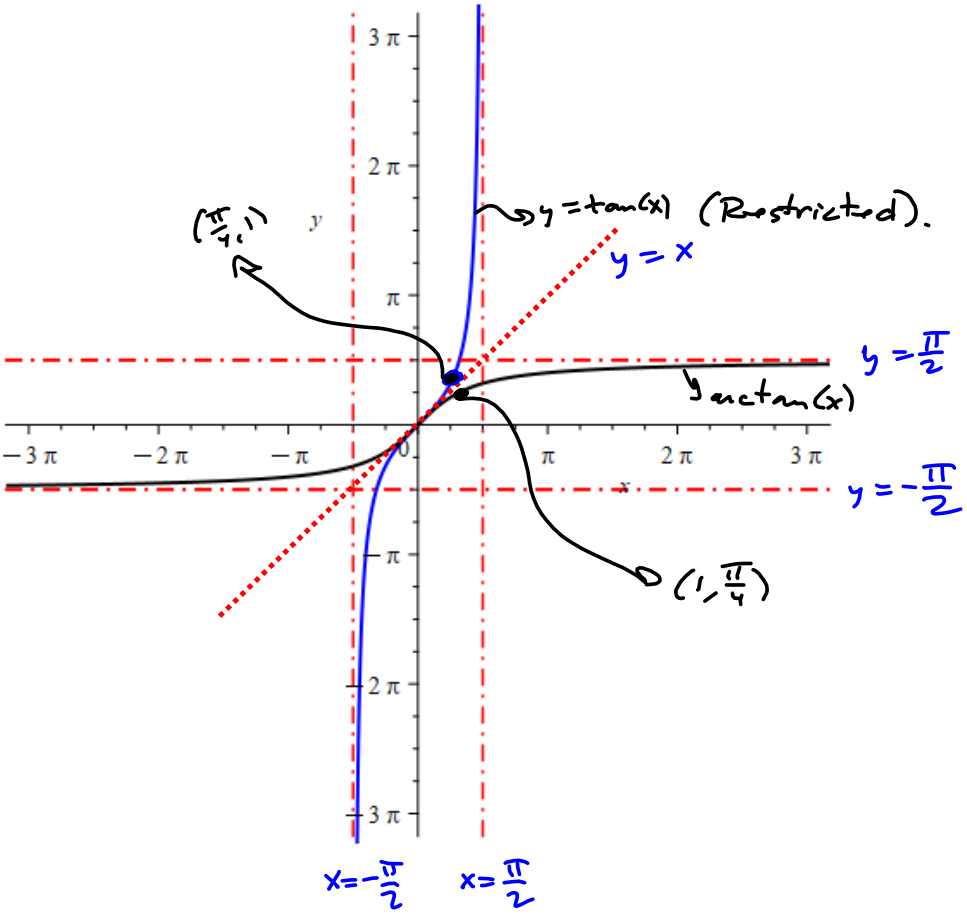




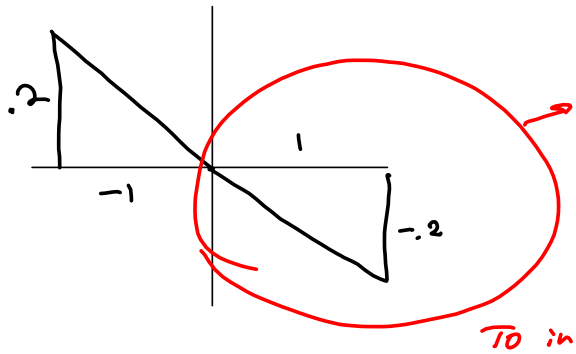
Restrict domain to $[-\frac{\pi}{2}, \frac{\pi}{2}]$

$R = (-\infty, \infty) = \mathbb{R}$.


π/2
y
−10
−5
5
10
x
−π/2
y = π/2
y = −π/2



Solve $\tan(x) = -.2$ on $[0, 2\pi]$



→ calculator sees this one

$\text{TAN}^{-1}(-.2) = \arctan(-.2)$

≈ -0.197396

To interpret:

$2\pi + \arctan(-.2) = x = 2\pi - .197396$ (Finish)

$\pi + \arctan(-.2) = x = \pi - .197396$