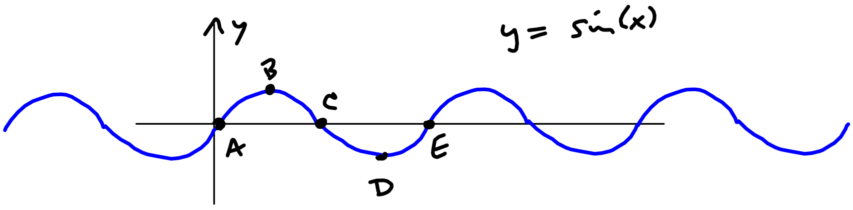
Questions from Chapter 1?

Graphs of trig functions....



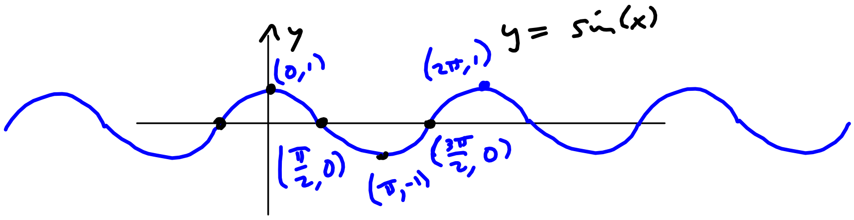

$A = (0,0)$

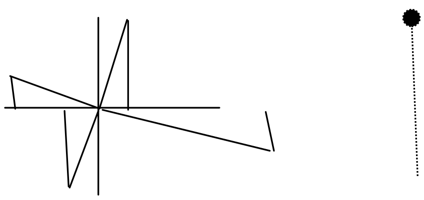
$B = (\frac{\pi}{2}, 1)$

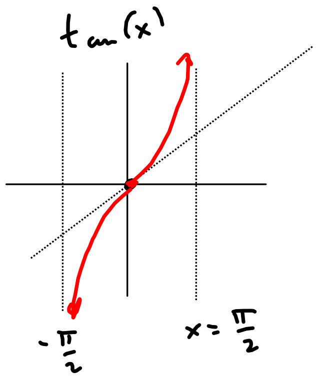
$C = (\pi, 0)$

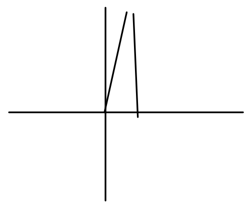
$D = (\frac{3\pi}{2}, -1)$

$E = (2\pi, 0)$





Inverse Trig Functions

$\sin^{-1}(y) = \arcsin(y)$

$x = \arcsin(y)$ means

$\sin(x) = y$

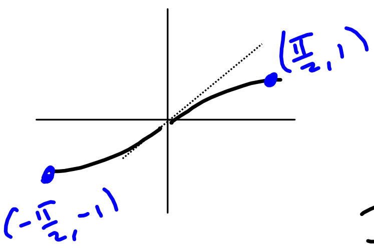
$\arcsin(\frac{1}{2}) = 30^0$

Note $\sin(150^0) = \frac{1}{2}$

so there's more than one way to btain

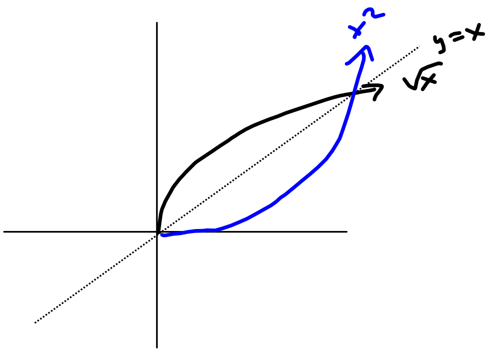
$\sin(x) = \frac{1}{2}$

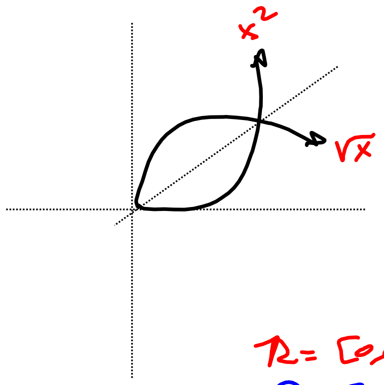
This means we have to restrict x to make arcsine a function.




If we restrict Domain to $x \in [-\frac{\pi}{2}, \frac{\pi}{2}]$ Then arcsine is a function.

Then we can talk about an inverse sine FUNTION.




Recall:

$y = \sqrt{x}$

$x = \sqrt{y} = x$

$\Rightarrow (\sqrt{y})^2 = x^2$

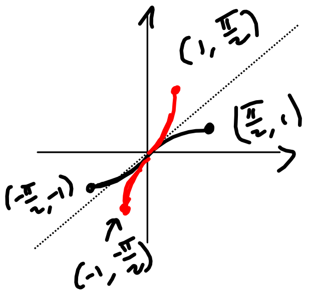
$y = x^2$ = Inverse

$\mathcal{R} = [0,\infty)$

$f(x) = \sqrt{x}$ $\mathcal{D} = [0,\infty)$

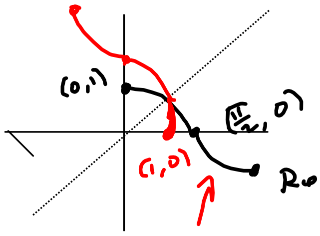
$\Rightarrow f^{-1}(x) = x^2$ $(D = [0,\infty))$

$\mathcal{R} = [0,\infty)$



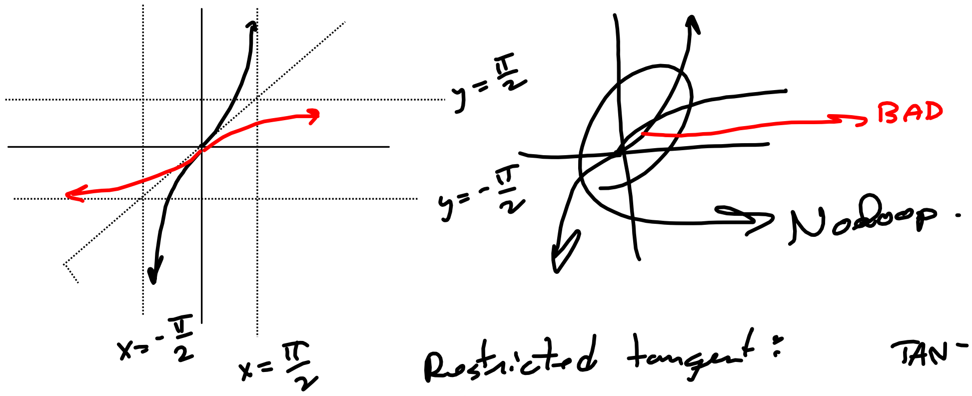

$\sin(x)$ —

$\arcsin(x)$ —




Restricted cosine

$(1,0)$




Restricted tangent:

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

$\mathcal{R} = (-\infty, \infty)$

TAN$^{-1}$, arctangent

$\mathcal{D} = (-\infty, \infty)$

$\mathcal{R} = (-\frac{\pi}{2}, \frac{\pi}{2})$

Same for

sine

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

$\mathcal{R} = [-1, 1]$

arcsine, SIN$^{-1}$

$\mathcal{D} = [-1, 1]$

$\mathcal{R} = [-\frac{\pi}{2}, \frac{\pi}{2}]$

Same for cosine

$\mathcal{D} = [0, \pi]$

$\mathcal{R} = [-1, 1]$

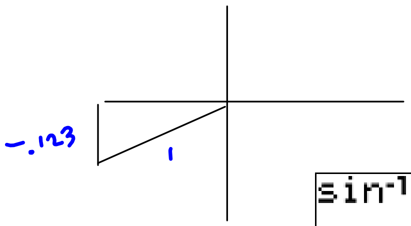
Arccosine, $\cos^{-1}$

$\mathcal{R} = [-1, 1]$

$\mathcal{D} = [0, \pi]$

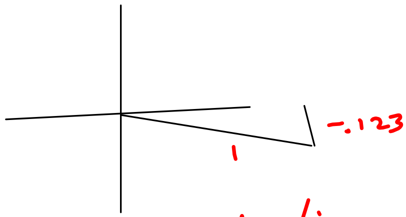
Find the angle in QIII whose sine is $-0.123$.

$\arcsin(-.123) \approx -7.065272931^\circ$




```
sin⁻¹(-.123)
    -7.065272931
```

mode: Degrees




Wrong quadrant.

Reference angle $-7.06...^\circ$

So in QIII, that's $180^\circ + 7.06...^\circ$

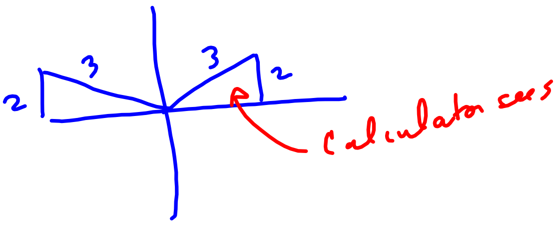
So angle $= 187.06...^\circ$

Solving angles with a calculator requires you to interpret and put things in the right quadrant.

Generally, inverse trig functions give you a reference angle, but not THE angle, unless it's from the restricted domain to start with.

Almost EVERY trig equation has two solutions between 0 and 2Pi or between $0^\circ$ and $360^\circ$.

Solve $\sin\theta = \frac{2}{3}$




$x = \arcsin\left(\frac{2}{3}\right), 180^\circ - \arcsin(2/3)$ Degrees

OR

$\arcsin\left(\frac{2}{3}\right), \pi - \arcsin(2/3)$ Radians

https://harryzaims.com/122/122-fall-20/tests-u-took/122-test-1-fall-20-solutions.pdf

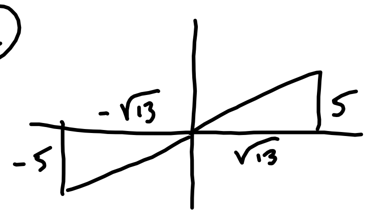
3. Basic concept: Draw the doggone pictures!

a. (5 points) Sketch two triangles that satisfy $\tan(\theta) = -\frac{5}{\sqrt{13}}$.

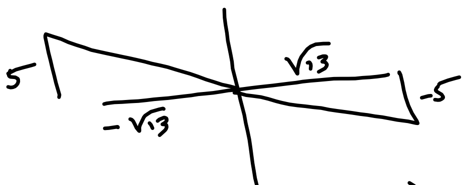
b. (5 pts) Assume the terminal side of the angle $\theta$ lies in the 3rd quadrant. Find the other five trigonometric functions of $\theta$.

c. (5 pts) Again, assuming $\theta$'s terminal side lies in Q III, and $0 \le \theta < 2\pi$, find $\theta$, in radians *and* degrees, rounded to 3 decimal places.

(a)




(b) $\tan(\theta) = -\frac{5}{\sqrt{13}}$




```
sin⁻¹(-.123)
          -7.065272931
tan⁻¹(-5/√(13))
          -54.20424009
tan⁻¹(-5/√(13))
          -.946042458
_
```

degrees

Radians

SOLVE for $\theta \in [0, 2\pi)$. In Radians

$\text{Artan}\left(-\frac{5}{\sqrt{13}}\right) \approx -.946042458 \notin [0, 2\pi)$!?

$\theta \approx 2\pi - .9460\ldots, \pi - .9460\ldots$

$\approx 2\pi + \arctan(-5/\sqrt{13}), \pi + \arctan(-5/\sqrt{13})$

4

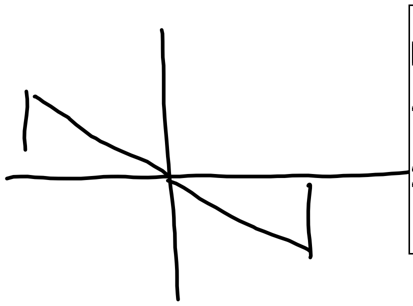
$\approx$

```
          -.946042458
Ans+2π
          5.337142849
tan⁻¹(-5/√(13))
          -.946042458
π+Ans
          2.195550196
```

$\tan(\theta) = \frac{5}{\sqrt{13}}$

$\theta = \arctan(5/\sqrt{13}), \pi + \arctan(5/\sqrt{13})$ EXACT

Find ALL solutions to $\tan\theta = -\frac{5}{\sqrt{13}}$



```
        -.946042458
Ans+2π
         5.337142849   ≈ 5.337
tan⁻¹(-5/√(13))
        -.946042458
π+Ans
         2.195550196   ≈ 2.196
```

$\theta \approx 5.337 + 2n\pi \quad \forall n \in \mathbb{Z}$

OR $\theta \approx 2.196 + 2n\pi \quad \forall n \in \mathbb{Z}$

SLICK: $\boxed{2.196 + n\pi, n \in \mathbb{Z}}$