Questions?

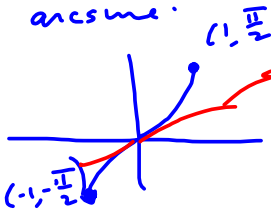
Recall: $\sin^{-1}$ key is arcsine function.

↳ Ambiguous. NOT $\frac{1}{\sin e}$, but the inverse of sine, as a function

↳ multiplicative inverse, i.e., reciprocal of sine, i.e., cosecant.

Today: cosine & tangent inverses.

arcsine:

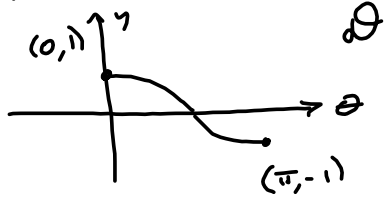


Restricted sine

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

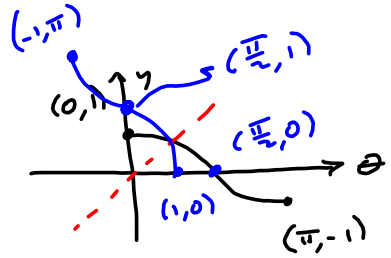
$\mathcal{R}$ (arcsine) = $[-\frac{\pi}{2}, \frac{\pi}{2}]$

Restricted Cosine:



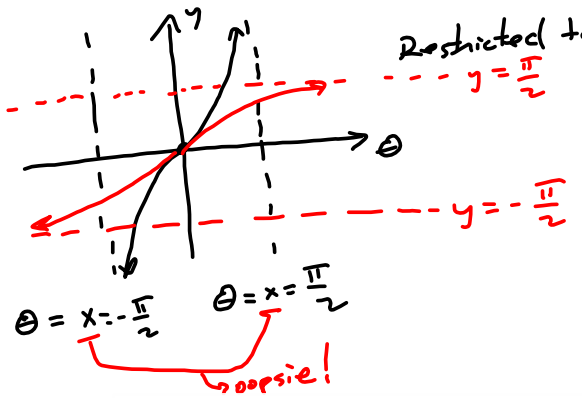
$\mathcal{D} = [0, \pi] = \mathcal{R}$ (arccosine)

$\mathcal{R} = [-1, 1] = \mathcal{D}$ (arccosine)



arccosine

cosine



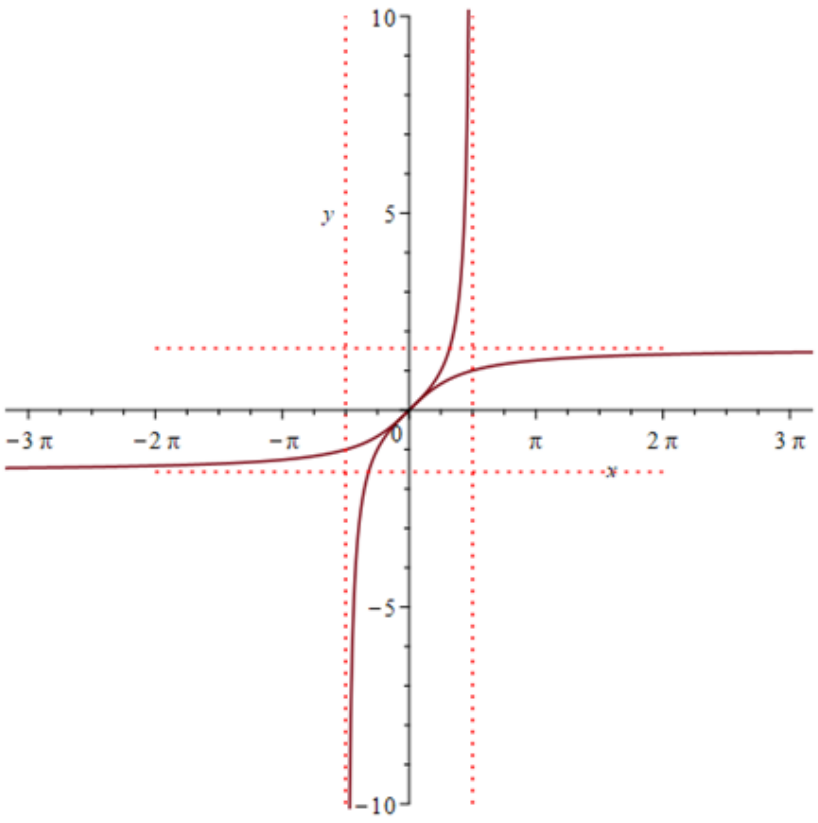
Restricted tangent

arctangent [redacted]

Restricted tangent [redacted]

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

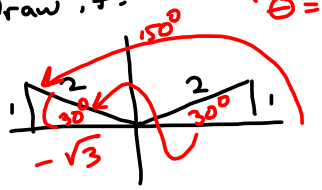
$\mathcal{R} = (-\infty, \infty) = \mathcal{D}(\text{arctangent})$



How do I solve $\csc\theta = 2$? Find all solutions $\theta \in [0°, 360°]$

I solve $\sin\theta = \frac{1}{2}$

Draw it:



"$\theta =$" $\arcsin(\sin\theta) = \arcsin\left(\frac{1}{2}\right) = 30°$

$\theta = 30°, 180° - 30° = 150°$

$\theta = 30°, 150°$ if the question says

SOL'N SET: $\theta \in \{30°, 50°\}$

```
sin⁻¹(.5)
          .52359878
sin⁻¹(.5)
          30.00000000
```

?! Oh. Radians Mode

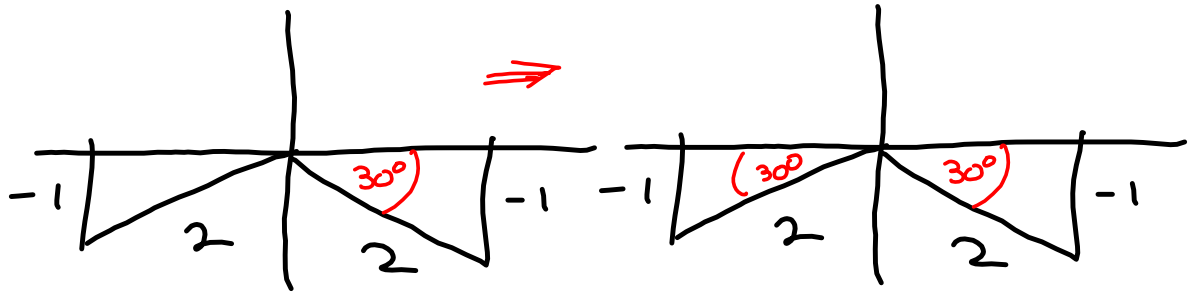
! $30°$

So $(30°)\left(\frac{\pi}{180°}\right) = \frac{\pi}{6}$

puts us below x-axis for sine

$\sin\theta = -\frac{1}{2}$

$\arcsin\left(-\frac{1}{2}\right) = -30°$

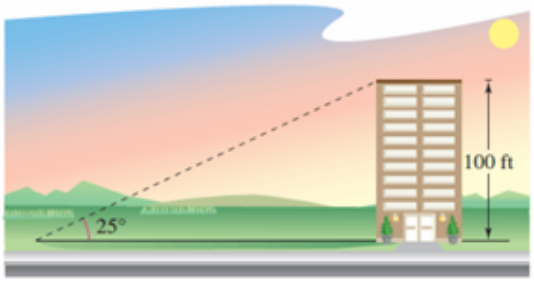


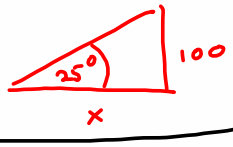
So, $\theta = -30°, -150°$, unless the question says solutions in $[0°, 360°]$ in which case, $\theta \in \{210°, 330°\}$ which WebAssign typically writes $\theta = 210°, 330°$.

13. 0/1 points LarTrig10 1.8.017. [3882036]

The sun is 25° above the horizon. Find the length of a shadow cast by a building that is 100 feet tall (see figure). (Round your answer to two decimal places.)

214.45 ft





Let x = the length of the shadow, in feet.

$\frac{x}{100} = \cot(25^\circ)$

$\frac{100}{x} = \tan(25^\circ)$ 'cuz I've an inverse tangent key.

$\Rightarrow \frac{100}{\tan(25^\circ)} = x$

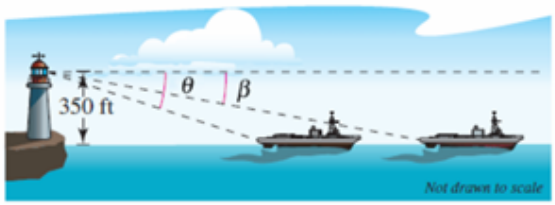
```
100/tan(25)
      214.4506921
```

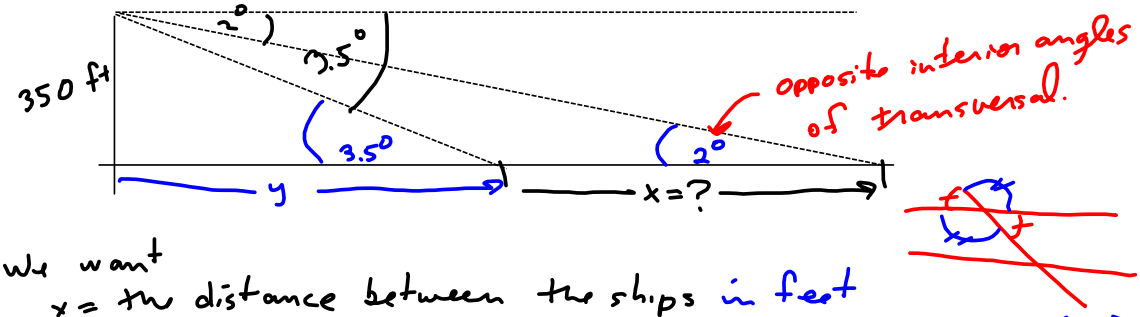
$\Rightarrow$ $x \approx 214.45$ ft

15. 0/1 points LarTrig10 1.8.022. [3882406]

An observer in a lighthouse 350 feet above sea level observes two ships directly offshore. The angles of depression to the ships are β = 2° and θ = 3.5° (see figure). How far apart are the ships? (Round your answer to one decimal place.)

4300.2 ft





We want

x = the distance between the ships in feet

y = " " " " 1st ship & lighthouse (ft)

What do we know?

$$\frac{350}{y} = \tan(3^\circ) \quad \& \quad \frac{350}{x+y} = \tan(2.5^\circ)$$

$y\tan(3^\circ) = 350$ → Now we know y.

$$y = \frac{350}{\tan(3^\circ)}$$

$$350 = (x+y)\tan(2.5^\circ)$$

$$= x\tan(2.5^\circ) + y\tan(2.5^\circ)$$

$$\Rightarrow x\tan(2.5^\circ) = 350 - y\tan(2.5^\circ)$$

$$x = \frac{350 - y\tan(2.5^\circ)}{\tan(2.5^\circ)}$$

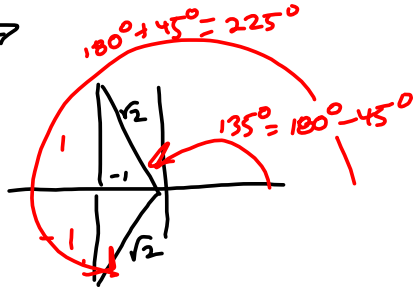
$$= \frac{350 - \left(\frac{350}{\tan(3^\circ)}\right)\tan(2.5^\circ)}{\tan(2.5^\circ)}$$

```
350-350/tan(3)ta
n(2.5)
      58.41485316
Ans/tan(2.5
      1337.920101 ≈ x
```

$\Rightarrow x \approx 1337.9$ ft

I got the 3.5 and 2 mixed-up. SHOULD be 3.5 and 2, not 2.5 and 3 in the calculation, above! Sheesh.

$\sec(x) = \sqrt{2} \Rightarrow \cos(x) = -\frac{1}{\sqrt{2}}$

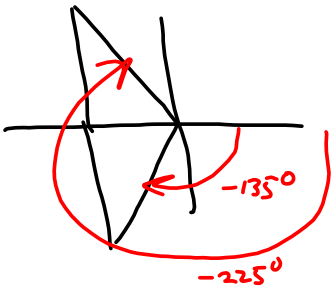


#s 24,25 on webassign Find all solns in $[-2\pi, 2\pi]$

$\theta = 135°, 225° \in [0°, 360°]$. Want π radians.

$= \frac{5\pi}{6}, \frac{7\pi}{6}$ → No! $\frac{3\pi}{4}, \frac{5\pi}{4}$

Need two ones in $[-2\pi, 0]$



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

$-135° = -\frac{3\pi}{4}$

$-225 = -\frac{5\pi}{4}$

Yeah. Use notes to find the video

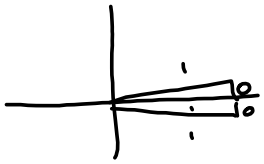
We got $\frac{3\pi}{4}$ & $\frac{5\pi}{4}$. To capture the negative angles is just to subtract $2\pi = \frac{8\pi}{4}$:

$\frac{3\pi}{4} - \frac{8\pi}{4} = -\frac{5\pi}{4}$

$\frac{5\pi}{4} - \frac{8\pi}{4} = -\frac{3\pi}{4}$

$\Rightarrow x = \left(-\frac{5\pi}{4}, -\frac{3\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}\right)$ is format for webAssign

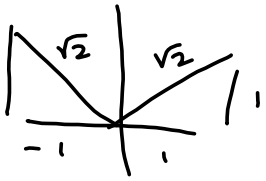
1.5 $\cos(x) = 1 \rightarrow$



$x = 0, 2\pi, -2\pi$

1.4 $\sin\theta = \frac{\sqrt{2}}{2} = \frac{1}{\sqrt{2}}$!

$\sin\theta = \frac{\sqrt{2}}{2} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{2}{2\sqrt{2}} = \frac{1}{\sqrt{2}}$



$\arcsin\left(\frac{\sqrt{2}}{2}\right)$ in DEGREES!

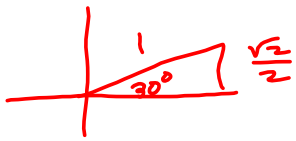
Then convert to radians, if necessary.

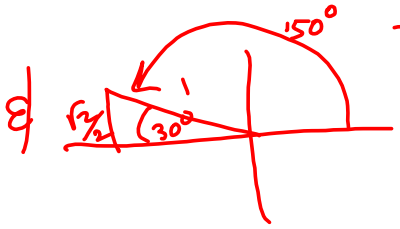
33. 0/4 points LarTrig10 1.4.092. [3881642]

Find two solutions of the equation. Give your answers in degrees ($0° \le \theta < 360°$) and in radians ($0 \le \theta < 2\pi$). Do not use a calculator. (Do not enter your answers with degree symbols. Enter your answers as comma-separated lists.)

(a) $\sin\theta = \frac{\sqrt{2}}{2}$

$\arcsin\left(\frac{\sqrt{2}}{2}\right) = 30°$





Degrees $30°, 150°$

Radians $\frac{\pi}{6}, \frac{5\pi}{6}$, via $(30°)\left(\frac{\pi}{180°}\right)$ & $(150°)\left(\frac{\pi}{180°}\right)$