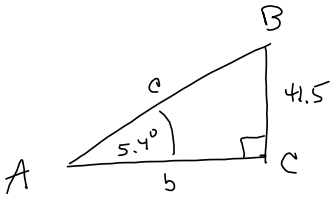
Test 1 Monday in a room to be announced, shortly.

Check D2L shell

Appointments?

$A = 5.4^\circ$, $a = 41.5$



$\sin(5.4^\circ) = \frac{41.5}{c}$

$c = \frac{41.5}{\sin(5.4^\circ)} \approx 440.9812325$

$\frac{41.5}{b} = \tan(5.4^\circ) \approx$

$\frac{41.5}{\tan(5.4^\circ)} = b \approx 439.0241422$

```
41.5/sin(5.4)
     440.9812325
41.5/tan(5.4
     439.0241422
```

$5.4^\circ + 90^\circ + B = 180^\circ$

$B = 180^\circ - 95.4^\circ = 84.60^\circ$

$\cot(5.4^\circ) = \frac{b}{41.5}$

$b = 41.5\cot(5.4^\circ)$

Walking of Spring '18 Test 1

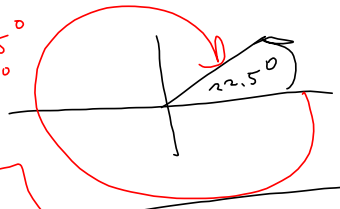
$\theta = \frac{33\pi}{8}$. Find 2 angles coterminal w/ θ $\in [-2\pi, 2\pi]$

$\frac{\frac{33\pi}{8}}{2\pi} = 2.0625 = 2 \text{ revs} + .0625 \text{ revs}$

Make this degrees!

$(.0625 \text{ revs})\left(\frac{360^\circ}{1 \text{ rev}}\right) = 22.5^\circ$

$360^\circ - 22.5^\circ = 338.5^\circ$



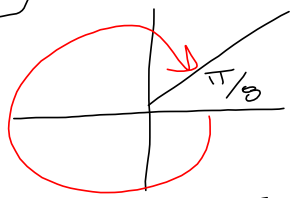
Want -338.5°

33π/(8*2*π)	2.0625
Ans−2	2.0625
Ans*360	.0625
	22.5

θ coterminal w/ 22.5° & -338.5°

$(22.5^\circ)\left(\frac{\pi}{180^\circ}\right) = \frac{\pi}{8}$

$(-338.5^\circ)\left(\frac{\pi}{180^\circ}\right) = \frac{15\pi}{8}$



$2\pi = \frac{16\pi}{8}$

$2\pi - \frac{\pi}{8} = \frac{16\pi - \pi}{8} = \frac{15\pi}{8}$

Radians Version

$\frac{\frac{33\pi}{8}}{2\pi} = 2.0625 = 2 \text{ revs} + .0625 \text{ revs}$

$(.0625 \text{ revs})\left(\frac{2\pi \text{ radians}}{1 \text{ rev}}\right)$

Ans▸Frac	.125
	1/8
.0625*2	.125
Ans▸Frac	1/8

$\Rightarrow \frac{\pi}{8}$ is the positive angle

$2\pi - \frac{\pi}{8} = \frac{15\pi}{8} \Rightarrow -\frac{15\pi}{8}$ is negative angle

$\left(\frac{\pi}{8}\right)\left(\frac{180^\circ}{\pi}\right) = 22.5^\circ$

$360^\circ - 22.5^\circ = 338.5^\circ$

$\left(\frac{-15\pi}{8}\right)\left(\frac{180^\circ}{\pi}\right) = -338.5^\circ$

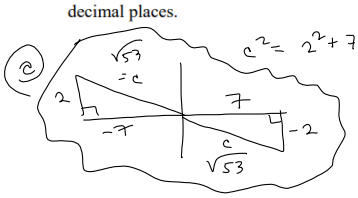
4. Answer the questions about the equation $\tan(\theta) = -\frac{2}{7}$.

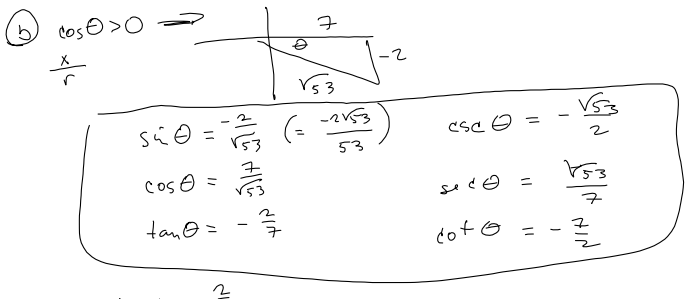
   a. (5 points) Sketch two triangles that satisfy $\tan(\theta) = -\frac{2}{7}$. $= \frac{y}{x} = \frac{-2}{7} = \frac{2}{-7}$

   b. (5 pts) Suppose that $\cos(\theta) > 0$. Find the other five trigonometric functions of θ.

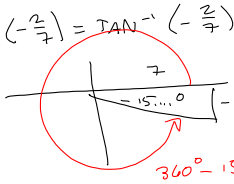
   c. (5 pts) Assuming $0 \le \theta < 2\pi$, find θ, in radians *and* degrees, rounded to 3 decimal places.

   d. (5 pts) Give *all* solutions to the equation $\sin(\theta) = -\frac{2}{7}$, in degrees *and* radians, rounded to three (3) decimal places.





$\tan\theta = -\frac{2}{7}$ & $\arctan\left(-\frac{2}{7}\right) = \text{TAN}^{-1}\left(-\frac{2}{7}\right) \approx -15.945395\ldots^\circ < 0$?!



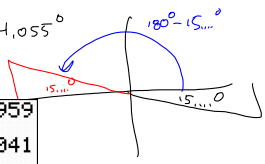
$360^\circ - 15.\ldots^\circ \approx 344.0546641^\circ$
$\approx 344.055^\circ$

```
                1/8
tan⁻¹(-2/7)
      -15.9453959
Ans+360
       344.0546041
Ans*π/180
       6.004885648
```

$(344.\ldots^\circ)\left(\frac{\pi}{180^\circ}\right) \approx 6.004885648$
≈ 6.0049

(d) Find ALL solns!

$\theta = 344.055^\circ$



$\theta' = \text{ref. angle} = 15.\ldots^\circ$

```
      -15.9453959
Ans+360
       344.0546041
Ans*π/180
       6.004885648
tan⁻¹(-2/7)+180
       164.0546041
```

So $\theta \approx 344.055^\circ, 164.055^\circ$
captures everything in $[0, 360^\circ]$
Method of things, which are 2π-periodic.
$344.055^\circ + 360^\circ n, \quad \forall n \in \mathbb{Z}$
$164.055^\circ + 360^\circ n, \forall n \in \mathbb{Z}$ for every/any/all n in the Integers, i.e., for all integers n.

Style (Nice)

$$\{344.055^\circ + 360^\circ n, 164.055^\circ + 360^\circ n \mid n \in \mathbb{Z}\}$$

$$= \{x + 360^\circ n \mid x = 344.055^\circ \text{ or } x = 164.055^\circ, n \in \mathbb{Z}\}$$ Set-builder notation

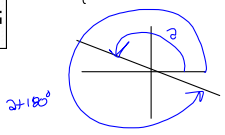
Radians version

$$\{x + 2\pi n \mid x = 2.863 \text{ or } x = 6.005, n \in \mathbb{Z}\}$$

```
       344.0546041
Ans*π/180
       6.004885648
tan⁻¹(-2/7)+180
       164.0546041
Ans*π/180
       2.863292995
```

This method works for sine, cosine and tangent.
Tangent's kind of special, because its period is Pi, not 2Pi, so this is also a complete answer:

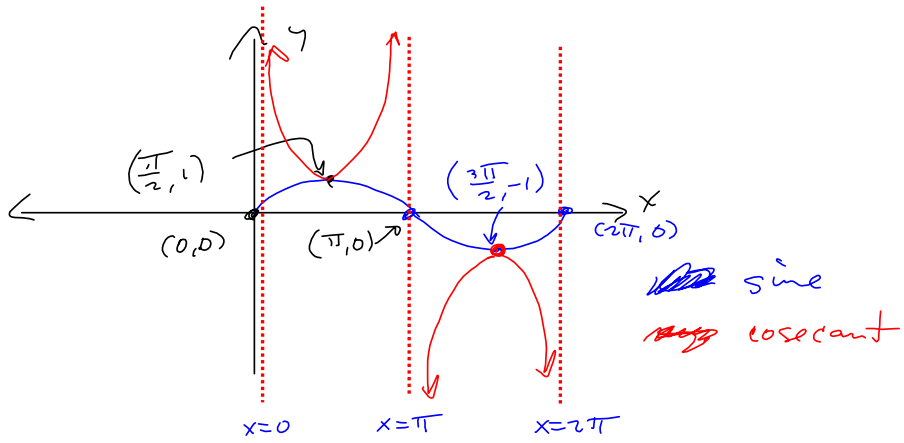
$$\{344.055 + 180^\circ n \mid n \in \mathbb{Z}\}$$



$\{6.005 + \pi n \mid n \in \mathbb{Z}$
More elegant than for sine/cosine, but one method covers all.

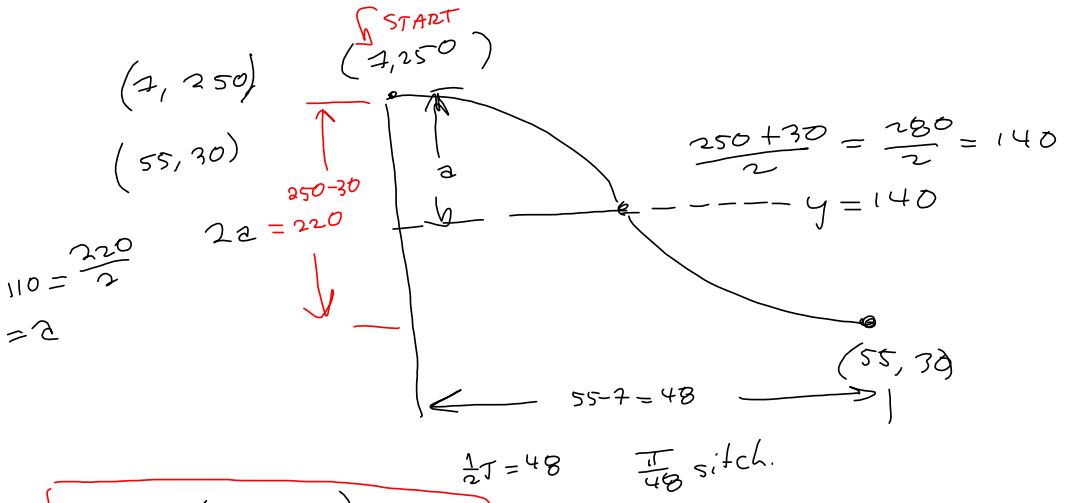
Reciprocal Functions

$\sin x = \frac{1}{\csc x}$ $\csc x = \frac{1}{\sin x}$



sine

cosecant



$110 \cos\left(\frac{\pi}{48}(x-7)\right) + 140$

$\frac{1}{2}T = 48 \Rightarrow$

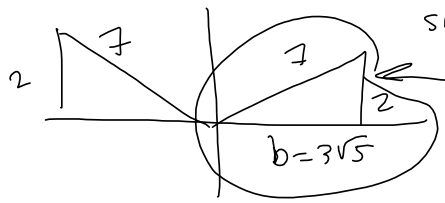
$T = 96$

want $bx = 2\pi$ @ $x = 96$

$96b = 2\pi$

$b = \frac{2\pi}{96} = \frac{\pi}{48}$

$\cot\left(\arcsin\left(\frac{2}{7}\right)\right) = \cot\theta$



SIN^{-1} Key $(\arcsin\frac{2}{7})$ only sees this one

$\arcsin$ (POS) always in QI

$49 - 4 = 45 = b^2$

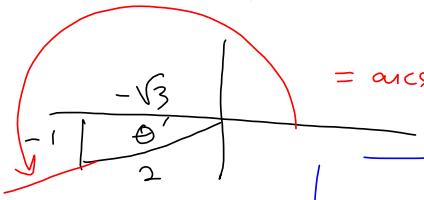
$b = \pm\sqrt{45}$ → b is pos.

so $b = \sqrt{45} = 3\sqrt{5}$

$\cot\theta = \frac{3\sqrt{5}}{2}$

$\arcsin\left(\sin\left(\frac{7\pi}{6}\right)\right)$ $\frac{7\pi}{6} \notin$ Range of $\arcsin(x)$

$R(\arcsin(x)) = \left[-\frac{\pi}{2}, \frac{\pi}{2}\right] = [-90^\circ, 90^\circ]$



$= \arcsin\left(\frac{-1}{2}\right) = -\frac{\pi}{6} \neq \frac{7\pi}{6}$

$\arcsin\left(\sin\left(\frac{7\pi}{6}\right)\right) = -\frac{\pi}{6}$

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