

Please Remind me to Hit 'Record.'

GRUNT

writing to learn
Don't care what
it looks like.
Talkin' to yourself
(cussin')

TURN-IN

writing to communicate

Blend the two?
Put a line thru mistakes &
keep going.

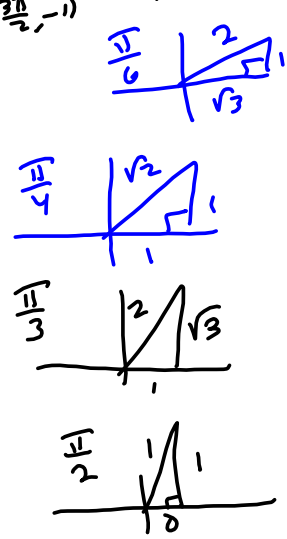
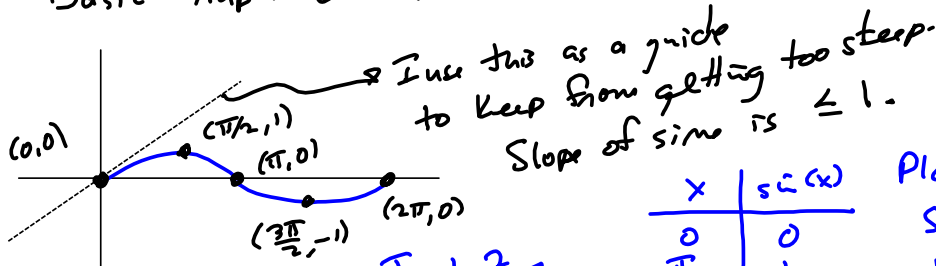
"I don't know to write."

"So you'll write MORE!"

I'm an idiot for not understanding
this identity: $\tan^2 \theta + 1 = \sec^2 \theta$.

If you're doing it right, you'll always feel stupid. Why? Because you don't understand what they're saying. Then when you FINALLY get it, you feel stupid because it's easy and it took you too long. And THEN, as soon as you master THAT, it's time for the next lesson that will make you feel stupid.

Basic Graph of Sine



x	sin(x)
0	0
$\frac{\pi}{6}$	$\frac{1}{2}$
$\frac{\pi}{4}$	$\frac{\sqrt{2}}{2} = \frac{\sqrt{2}}{2}$
$\frac{\pi}{3}$	$\frac{\sqrt{3}}{2}$
$\frac{\pi}{2}$	1

Yawn

Plotting Points Sucks. Understanding the basic shape is key.

In College Algebra, we teach graphing by transforming basic functions;

$$a f(x) \quad (x, y) \mapsto (x, ay)$$

$$f(bx) \quad (x, y) \mapsto \left(\frac{1}{b}x, y\right)$$

$$f(x+c) \quad (x, y) \mapsto (x-c, y)$$

$$f(x) + d \quad (x, y) \mapsto (x, y+d)$$

$$a \sin(b(x-c)) + d$$

horizontal (Phase) shift $x=c$ is starting point
 vertical shift $y=d$ is midline

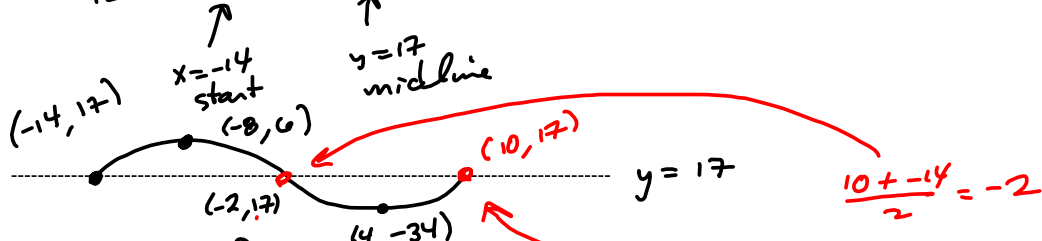
Amplitude
 vertical stretch/shrink

Frequency (wavelength)
 horizontal stretch/shrink

$$f(x) = 20 \sin\left(\frac{\pi}{12}x + \frac{7\pi}{6}\right) + 17.$$

$$\frac{\frac{7\pi}{6}}{\frac{\pi}{12}} = \frac{7\pi}{6} \cdot \frac{12}{\pi} = 14$$

$$= 20 \sin\left(\frac{\pi}{12}(x+14)\right) + 17$$



The period of sine is 2π

when is $\frac{\pi}{12}x = 2\pi$?

$$x = \frac{12}{\pi} \cdot 2\pi = 24 = T = \text{Period}$$

$$-14 + 24 = 10$$

Alternatively, Increment is $\frac{24}{4} = 6$

$$-14 + 6 = -8$$

$$-8 + 6 = -2$$

$$-2 + 6 = 4$$

Now for highs & lows:

$$a = 20$$

$$-14 + 20 = 6$$

$$-14 - 20 = -34$$

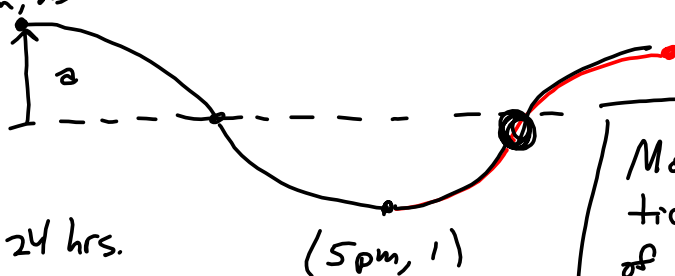
Build a sinusoid
when given highs & lows

High Tide is 25 ft @ 5pm

Low Tide .. 1 ft @ 5am

5am, 25

24-hour
period



Period is 24 hrs.

$$bx = 2\pi, \text{ when } x = 24$$

$$24b = 2\pi$$

$$b = \frac{2\pi}{24} = \frac{\pi}{12} : a \cos\left(\frac{\pi}{12}(x-c)\right) + d$$

$$5\text{pm is } x = 17 : a \cos\left(\frac{\pi}{12}(x-17)\right) + d$$

$$\text{Amplitude} = \frac{1}{2}(\text{High} - \text{Low})$$

$$= \frac{1}{2}(25 - 1) = \frac{1}{2}(24) = 12$$

$$12 \cos\left(\frac{\pi}{12}(x-17)\right) + d$$

$$\text{Midline} = \frac{1}{2}(\text{High} + \text{Low}) = \frac{1}{2}(25 + 1) = \frac{1}{2}(26) = 13$$

$$\boxed{12 \cos\left(\frac{\pi}{12}(x-17)\right) + 13}$$

$$= 12 \cos\left(\frac{\pi}{12}(x+7)\right) + 13$$

$$= 12 \cos\left(\frac{\pi}{12}(x-41)\right) + 13$$

4. Answer the questions about the equation $\cot(\theta) = -\frac{5}{2}$. (i.e. $\tan\theta = -\frac{2}{5}$)

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

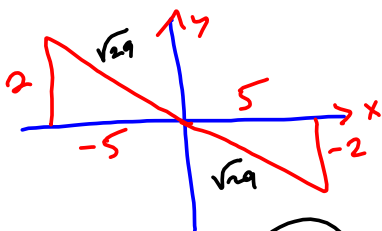
b. (5 pts) Suppose that $\cos(\theta) < 0$. Find the other five trigonometric functions of θ .

In class, it seemed like the next two took a long time for how much they were worth...

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

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

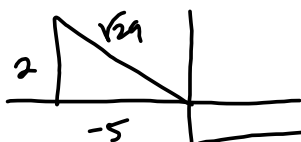
(a) $\cot(\theta) = -\frac{5}{2}$ ($\tan(\theta) = -\frac{2}{5}$)



$$x^2 + y^2 = r^2 = 2^2 + 5^2 = 4 + 25 = 29$$

$$\Rightarrow r = \pm\sqrt{29} \Rightarrow r = +\sqrt{29}$$

(b) $\cot\theta = -\frac{5}{2}$ (AND) $\cos(\theta) < 0$



$$\sin\theta = \frac{2}{\sqrt{29}} \cdot \frac{\sqrt{29}}{\sqrt{29}} = \frac{2\sqrt{29}}{29} = \sin\theta$$

$$\cos\theta = \frac{-5}{\sqrt{29}} \cdot \frac{\sqrt{29}}{\sqrt{29}} = \frac{-5\sqrt{29}}{29} = \cos\theta$$

$$\tan\theta = -\frac{2}{5}$$

$$\csc\theta = \frac{\sqrt{29}}{2}$$

$$\sec\theta = -\frac{\sqrt{29}}{5}$$

$$\cot\theta = -\frac{5}{2}$$

c) $\cot \theta = -\frac{5}{2} \Rightarrow \tan \theta = -\frac{2}{5}$

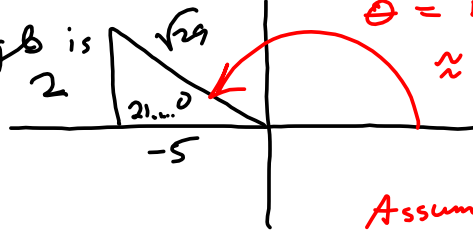
$\approx -21.80140949^\circ$?!
But we're in Q II !!

```
tan-1(-2/5)
-.38050638
Ans*180/π
-21.80140949
Ans+180
158.1985905
```



This says

OUR triangle is



$\theta = 180^\circ - 21.80^\circ$

$\approx 158.1985905^\circ$

$\approx 158.199^\circ \approx \theta$

```
-.38050638
Ans*180/π
-21.80140949
Ans+180
158.1985905
Ans+180
338.1985905
```

Assuming $\cos \theta < 0$
from part b.

If NOT, then

$\theta \in \{ 158.199^\circ, 338.199^\circ \}$

d) All of 'em
Finish next time

Leave for next time
I didn't finish radians for part c