Questions?

5. 0/3 points LarTrig10 1.3.064. [3881499]

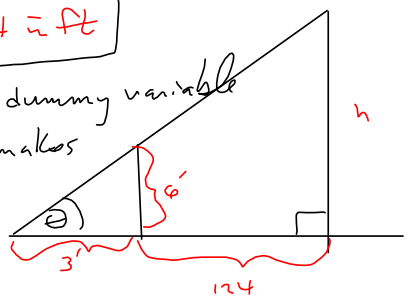
A six-foot person walks from the base of a broadcasting tower directly toward the tip of the shadow cast by the tower. When the person is 124 feet from the tower and 3 feet from the tip of the shadow, the person's shadow starts to appear beyond the tower's shadow.

(a) Draw a right triangle that gives a visual representation of the problem. Label the known quantities of the triangle and use a variable to represent the height of the tower.

(b) Use a trigonometric function to write an equation involving the unknown quantity h.

$\tan(\theta) = \frac{6}{3} =$ [ ] ✗ $\frac{h}{127}$

Lexicon:
h = height in ft



(c) What is the height of the tower?

[ ] ✗ 254 ft

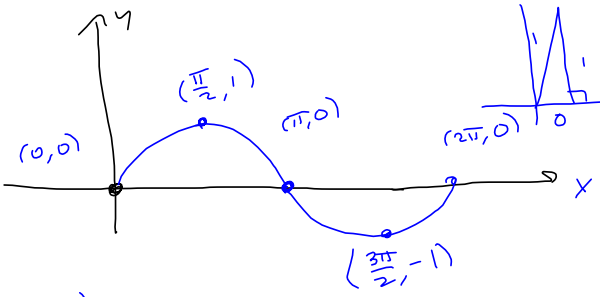
θ = kind of a dummy variable
= angle the shadow makes with the ground.

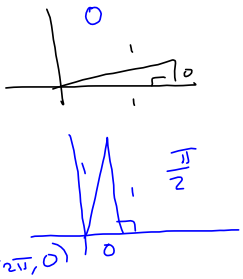
$\frac{h}{127} = \tan\theta = \frac{6}{3} = 2 \Rightarrow$

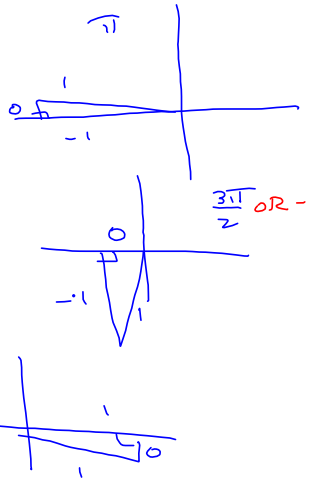
$h = 2(127) = 254\text{ ft} = h$

Basic Graphs

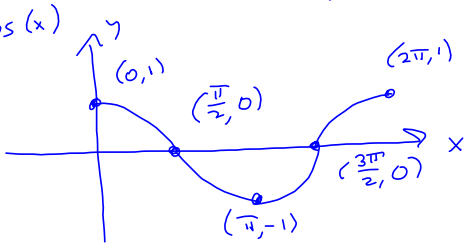
$y = \sin(x)$

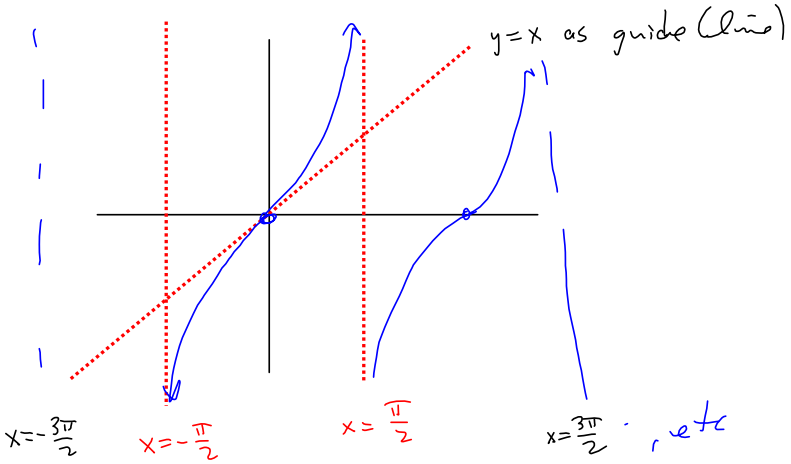






$y = \cos(x)$





30. 0/13 points LarTrig10 1.5.084. [3881904

The table shows the maximum daily high temperatures (in degrees Fahrenheit) in Las Vegas L and International Falls I for month t, where $t = 1$ corresponding to January.†

Month, t	Las Vegas, L	International Falls, I
1	57.1	13.8
2	63.0	22.4
3	69.5	34.9
4	78.1	51.5
5	87.8	66.6
6	98.9	74.2
7	104.1	78.6
8	101.8	76.3
9	93.8	64.7
10	80.8	51.7
11	66.0	32.5
12	57.3	18.1

(7, 78.6)
(13, 13.8)

(a) A model for the temperature in Las Vegas is

Let t = time in months

Period = 12 months = T

$t = 1 \iff t = 13$

cosine has period of 2π

$\cos(bt)$ with period $T = 12$

want $bt = 2\pi$ when $t = 12$

$12b = 2\pi$

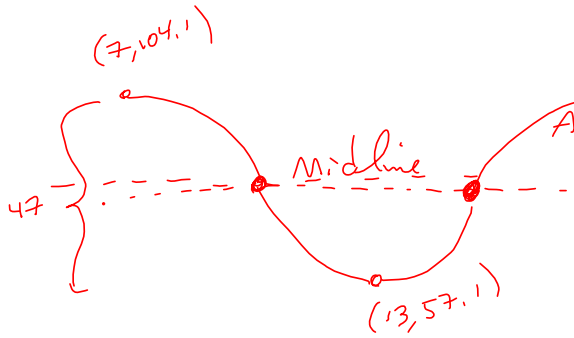
$b = \frac{2\pi}{12} = \frac{\pi}{6}$

$\cos\left(\frac{\pi}{6}t\right)$

High Point: $t = 7$

Cosine's high point is $t = 0$

$A\cos\left(\frac{\pi}{6}(t-7)\right) + D$



midline

A = Amplitude:

$104.1 - 57.1 = 47$

$\frac{47}{2} = 23.5 = A$

$23.5\cos\left(\frac{\pi}{6}(t-7)\right) + d$

mid: $\frac{104.1 + 57.1}{2} = \frac{161.2}{2} = 80.6 = y = \text{midline}$

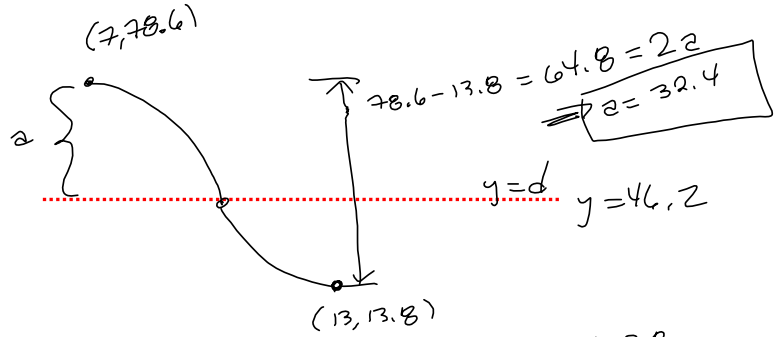
$23.5\cos\left(\frac{\pi}{6}(t-7)\right) + 80.6$

$\frac{\pi}{6}t - \frac{\pi}{6}\cdot 7 \approx 3.665191431 \approx 3.67$

So, WebAssign answer is a quirky

$23.5\cos\left(\frac{\pi}{6}t - 3.67\right) + 80.6$

(7, 78.6)
(13, 13.8)



$a\cos(b(t-c))+d$

$32.4\cos(b(t-c))+d$

$32.4\cos(b(t-c))+46.2$

Period $13-7=6$ is $\frac{1}{2}$ period

$T = 12$ is period

$bt = 2\pi$ when $t = 12$

$12b = 2\pi$

$b = \frac{\pi}{6}$

Avg of high & low

mid: $d = \frac{78.6+13.8}{2}$

$= \frac{92.4}{2} = 46.2 = d$

Finally, start @ $t=7 \Rightarrow c = 7$

$32.4\cos\left(\frac{\pi}{6}(t-7)\right)+46.2$

$= 32.4\cos\left(\frac{\pi}{6}t - \frac{7\pi}{6}\right)+46.2$

$= 32.4\cos\left(\frac{\pi}{6}t - 3.7\right)+46.2$

WebAssign says:

$32.4\cos\left(3.7-\frac{\pi t}{6}\right)+46.2$

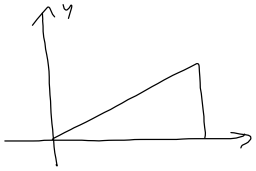
$= 32.4\cos\left(-\left(\frac{\pi}{6}t - 3.7\right)\right)+46.2$

$= 32.4\cos\left(\frac{\pi}{6}t - 3.7\right)+46.2$

Expect a take-home problem along these lines for Test 1.

Right-Angle Trig in Quadrant I $0 \le \theta \le \frac{\pi}{2}$

Inverse Trig Functions on a calculator. $0 \le \theta \le 90^\circ$

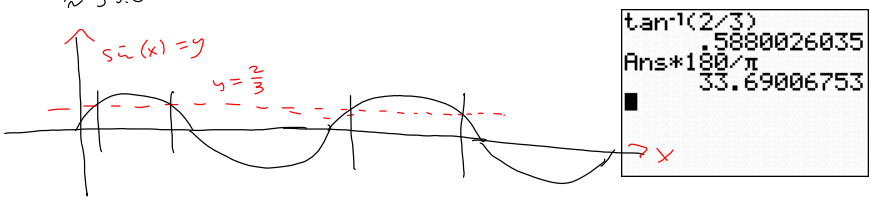


As long as we stay in QI, then calculator answer is THE answer. There are some issues when we're out of QI

Solve $\tan\theta = \frac{2}{3}$, Assume $0 < \theta < \frac{\pi}{2}$

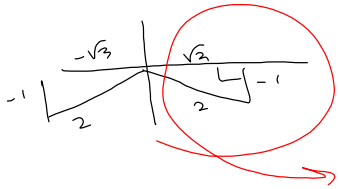
$\text{TAN}^{-1}(\tan\theta) = \theta = \text{TAN}^{-1}\left(\frac{2}{3}\right) \approx .5880026035$

$\approx 33.69006753^\circ$



There are ∞'ly many solutions to $\sin(x) = \frac{2}{3}$ Your calculator gives you the one in QI

$\sin(x) = -\frac{1}{2}$ " " " " " negative one in QIV



Calc says $\sin(x) = -\frac{1}{2} \Rightarrow$ $x = -30^\circ$ OR $-\frac{\pi}{6}$

Next time Domain & Range of restricted tangent, sine, cosine curves—
We want to understand the workings of

arctangent, arcsine, arccosine

TAN^{-1} SIN^{-1} $\cos^{-1}$

Inverse, with respect to function composition, not arithmetic (multiplication).

$\sin^2(x) = (\sin(x))^2$

$\sin^{-13}(x) = \frac{1}{(\sin(x))^{13}} = \csc^{13}(x)$

$\sin^{-1}(x)$ means $\arcsin(x)$