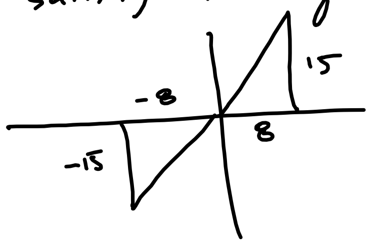
Don't let 1.3 trick you into only seeing Quadrant I.

Find the 6 trig values for the angle satisfying $\tan\theta = \frac{15}{8}$

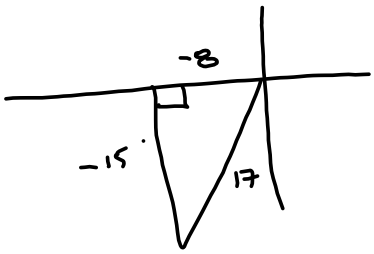
This is poorly posed! There are 2 angles in $[0, 2\pi)$ that satisfy this equation



One in QI.
" " QIII!

The book adds the condition $\sin\theta < 0$.

This means: Quadrant III ($\sin\theta > 0$ QI)



$8^2 + 15^2 = 64 + 225 = 289 = 17^2$

$\Rightarrow r = 17$

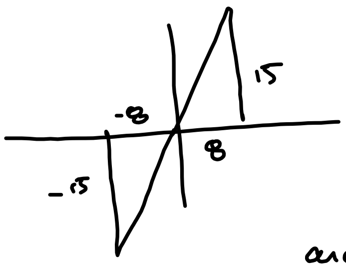
$\sin\theta = -\frac{15}{17}$ $\quad$ $\csc\theta = -\frac{17}{15}$

$\cos\theta = -\frac{8}{17}$ $\quad$ $\sec\theta = -\frac{17}{8}$

$\tan\theta = \frac{15}{8}$ $\quad$ $\cot\theta = \frac{8}{15}$

Find the EXACT Solutions in $[0, 2\pi)$ that solve

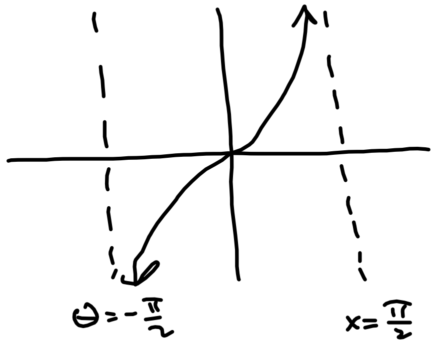
$\tan\theta = \frac{15}{8}$

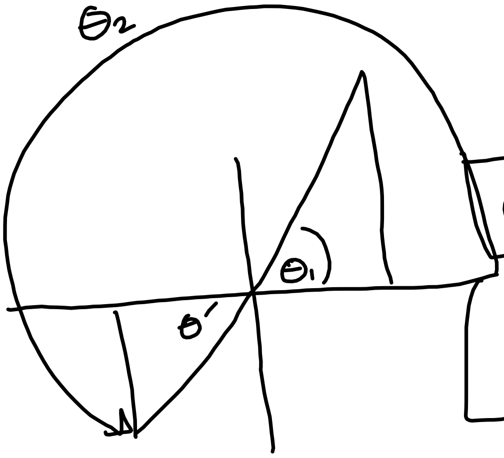


$\boxed{\arctan\left(\frac{15}{8}\right)}$ = the exact soln in $[0, \frac{\pi}{2})$

Can't make it simplify any farther and still be exact.

$\arctan(z)$ spits out values between $-\frac{\pi}{2}$ & $\frac{\pi}{2}$



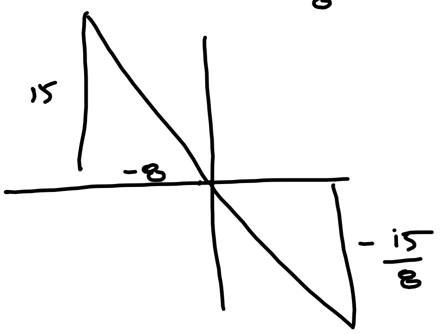


$\boxed{\theta_1 = \arctan\left(\frac{15}{8}\right)}$

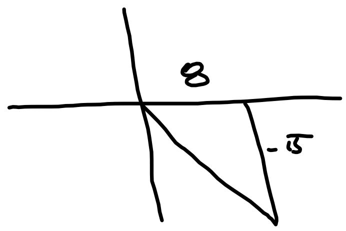
$$\boxed{\begin{gathered}\theta' = \arctan\left(\frac{15}{8}\right) \\ \theta_2 = \pi + \theta'\end{gathered}}$$

Find all sol'ns $\theta \in [0, 2\pi)$ such that

$$\tan\theta = -\frac{15}{8}$$

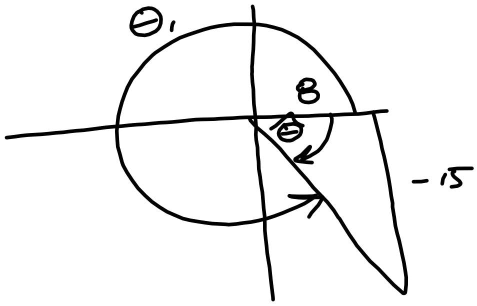


$\arctan\left(-\frac{15}{8}\right)$ calculator:



$\arctan\left(-\frac{15}{8}\right) \approx -61.9275130641^\circ$ oops! Degrees!

$\arctan\left(-\frac{15}{8}\right) \approx -1.08083900054$



$\hat{\theta} = -1.08\ldots$

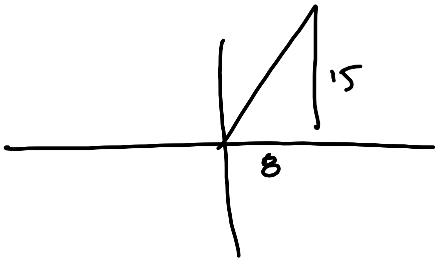
Want an angle between 0 & 2π. This isn't!

$\theta_1 = 2\pi + \hat{\theta}$

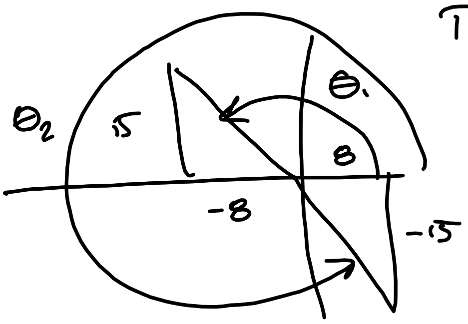
$= 2\pi + \arctan\left(-\frac{15}{8}\right)$

Another approach:

$\arctan\left(-\frac{15}{8}\right) = -\arctan\left(\frac{15}{8}\right)$



$\arctan\left(\frac{15}{8}\right) \longrightarrow$



Then $\theta_1 = \pi - \arctan\left(\frac{15}{8}\right)$

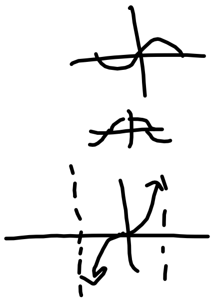
$\theta_2 = 2\pi - \arctan\left(\frac{15}{8}\right)$

FACTS:

$\sin\theta$ odd

$\cos\theta$ even

$\tan\theta$ odd



$\sin(-\theta) = -\sin\theta$

$\cos(-\theta) = \cos\theta$

$\tan(-\theta) = \frac{\sin\theta}{\cos\theta} = \frac{-}{+} = -$

$= -\tan\theta$

Show that

$$\tan\theta \cot\theta = 1$$

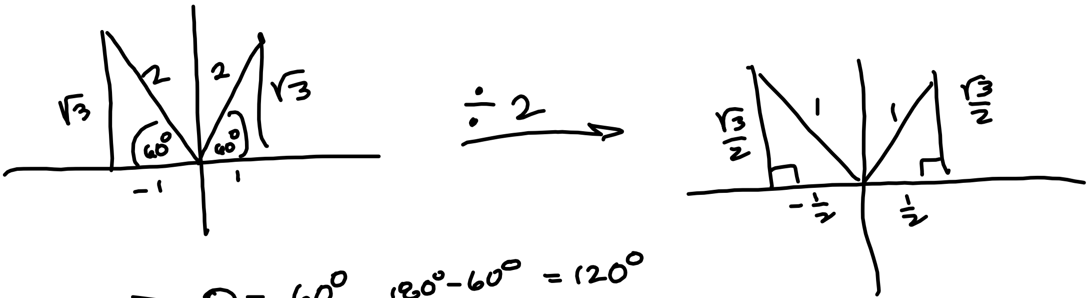
Proof $\quad \dfrac{\sin\theta}{\cos\theta} \cdot \dfrac{\cos\theta}{\sin\theta} = 1$

LarTrig10 1.4.094.

34. Find two solutions of each 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.)

(b) $\csc(\theta) = \dfrac{2\sqrt{3}}{3}$ to see it:

$\sin\theta = \dfrac{3}{2\sqrt{3}} \cdot \dfrac{\sqrt{3}}{\sqrt{3}} = \dfrac{3\sqrt{3}}{2 \cdot 3} = \dfrac{\sqrt{3}}{2}$

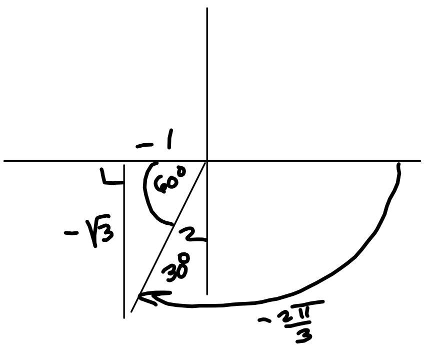


$\Rightarrow \theta = 60°, \; 180° - 60° = 120°$

or $\frac{\pi}{3}, \frac{2\pi}{3}$

Find $\sin\left(-\frac{2\pi}{3}\right)$, $\cos\left(-\frac{2\pi}{3}\right)$, $\tan\left(-\frac{2\pi}{3}\right)$

$$-\frac{2\pi}{3} = -120^\circ$$



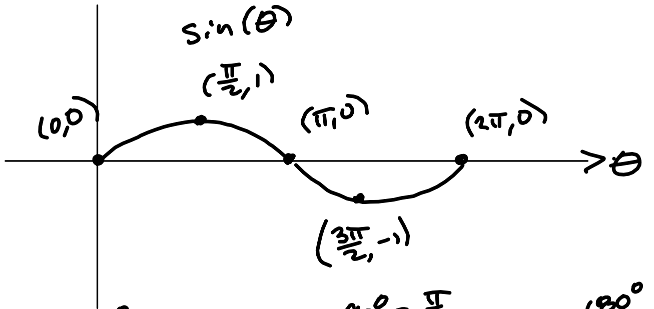
$$\theta' = 60^\circ = \frac{\pi}{3}$$

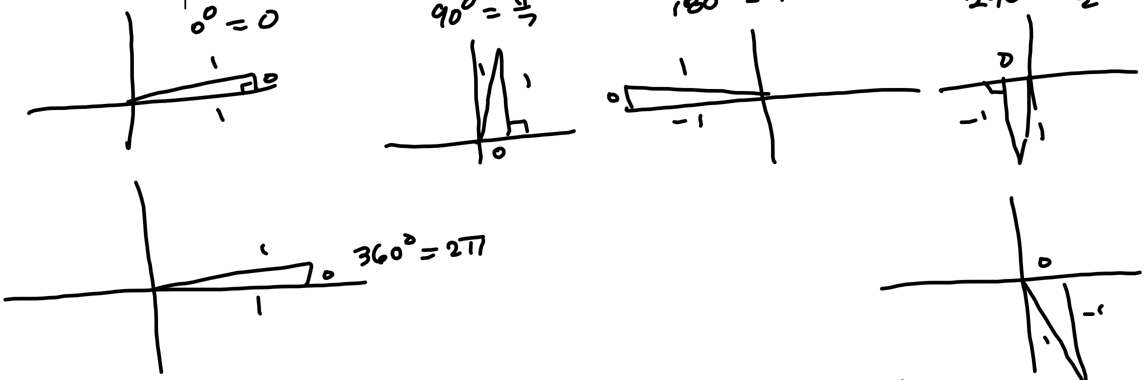
$$\sin\left(-\frac{2\pi}{3}\right) = -\frac{\sqrt{3}}{2} = \frac{y}{r}$$

$$\cos\left(-\frac{2\pi}{3}\right) = \frac{-1}{2} = \frac{x}{r}$$

$$\tan\left(-\frac{2\pi}{3}\right) = \frac{y}{x} = \frac{-\sqrt{3}}{-1} = \sqrt{3}$$

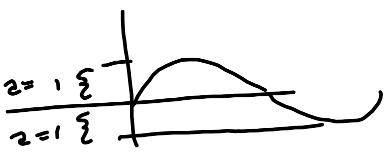
Section 1.5 Graphs of Sine and Cosine





Amplitude = a = distance from midline to max/min

Amplitude of sine is 1

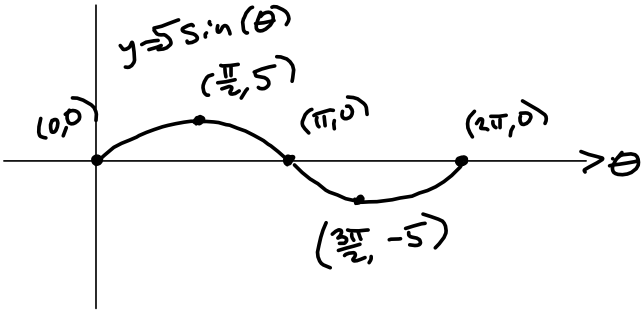


$5\sin\theta$ has amplitude $5 = a$

$5f(\theta)$ $y \mapsto 5y$

Period of sine is 2π (360°)

STARTS @ $\theta = 0$ on the midline. Midline is $y = 0$.



College algebra:

$$a\,f(b(x-c)) + d = a\,f(bx - bc) + d$$

$\uparrow$ ay

$\uparrow$ $bx = 2\pi$ when $x = \frac{2\pi}{b}$ = period

Horizontal shift $x \to x + c$

midline is $y = d$ (up d) $y \mapsto y + d$

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

$\sin(bx)$

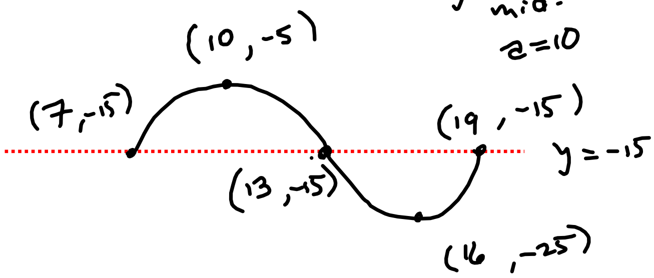
$\sin(b(x-c))$

$\uparrow$ $x \mapsto \frac{1}{b}x$

$$y = 10\sin\left(\frac{\pi}{6}x - \frac{7\pi}{6}\right) - 15$$
$$= 10\sin\left(\frac{\pi}{6}(x-7)\right) - 15$$

$\frac{\pi}{6}(x-7) = \frac{\pi}{6}x - \frac{7\pi}{6}$

$y = -15$ mid.
$a = 10$



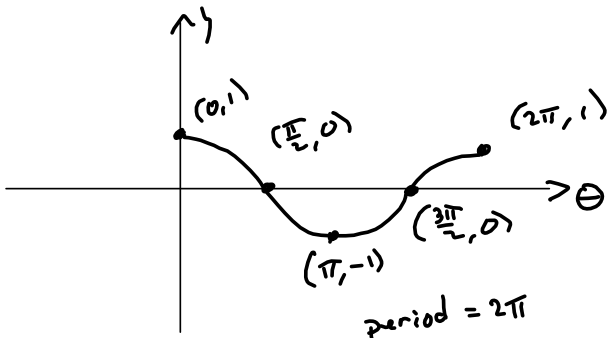
$\frac{\pi}{6}x = 2\pi$

$x = \frac{2\pi}{\frac{\pi}{6}} = 12$ ~ Period

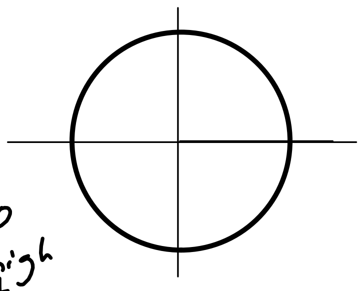
START @ $x = 7$

$$\text{Increment} = \frac{\text{Period}}{4} = \frac{12}{4} = 3$$

Cosine's the same deal, only it starts at its high point.



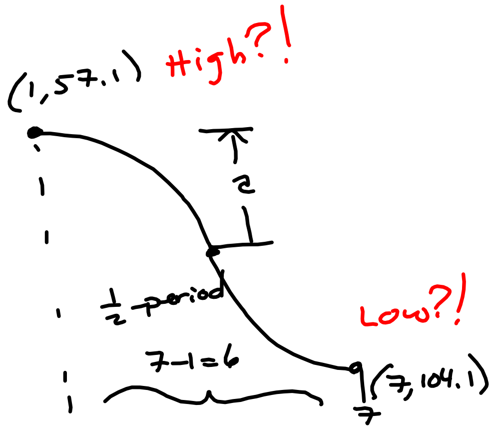
$y = \cos\theta$



period = 2π
a = 1
start @ θ = 0
with high point.

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
Low	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
High	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



Period = 12 months

$$a = \frac{104.1 - 57.1}{2} = \frac{HIGH - Low}{2} = \frac{47}{2}$$

$$\frac{47}{2}\cos(b(x-c)) + d$$

Fix HIGH & Low:

OR

Just Do $-\frac{47}{2}\cos(b(x-c)) + d$

Find midline $= \frac{HIGH+LOW}{2} = \frac{104.1+57.1}{2} = \frac{161.2}{2}$

$= 80.6$

$=$ midline

$y = \frac{47}{2}\cos\left(b(x-7)\right) + 80.6$

want $bx = 2\pi$ when $x = 12$

$12b = 2\pi \longrightarrow$

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

$y = \frac{47}{2}\cos\left(\frac{\pi}{6}(x-7)\right) + 80.6$

$L(t) = 80.60 + 23.50\cos\left(\frac{\pi t}{6} - 3.67\right).$

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

3.66519142919