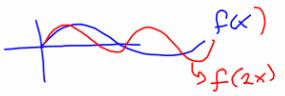
College Algebra Review:

Basics of transformin graphs,

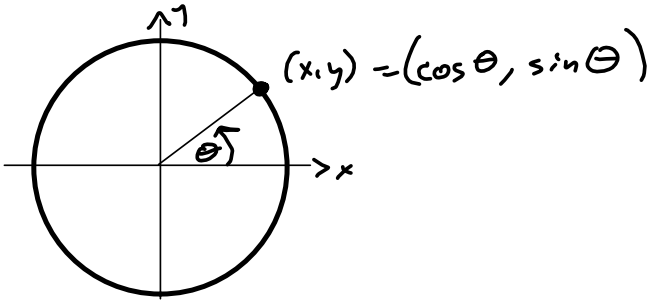
from $f(x)$ to $af(bx-c)+d$

1. $af(x)$ vertical stretch by factor of a: $(x,y) \to (x, ay)$
2. $f(bx)$ horizontal stretch by " " $\frac{1}{b}$: $(x,y) \to (\frac{1}{b}x, y)$
3. $f(x-c)$ Right phase shift by c units: $(x,y) \to (x+c, y)$
4. $f(x)+d$ Up d units $(x,y) \to (x, y+d)$

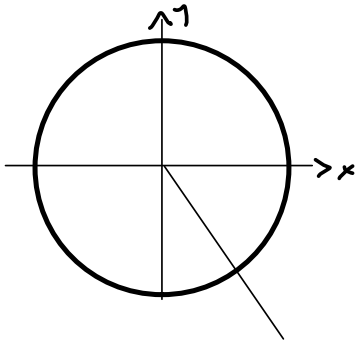


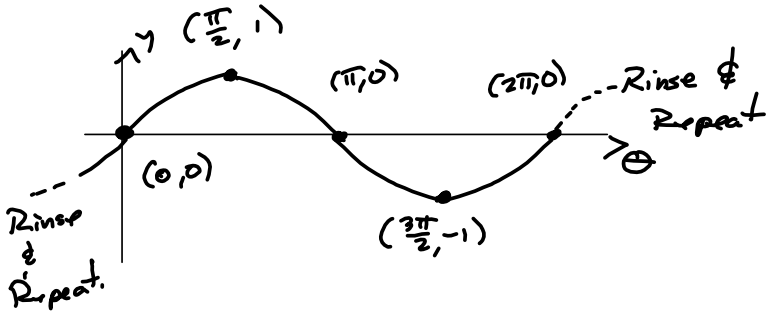
Taken from 1.5 Homework Notes and Videos (Click Here!)

$\sin(\theta)$ is the y-coordinate of the point (x,y) on the unit circle corresponding to the angle θ measured counter-clockwise from the positive x-axis.

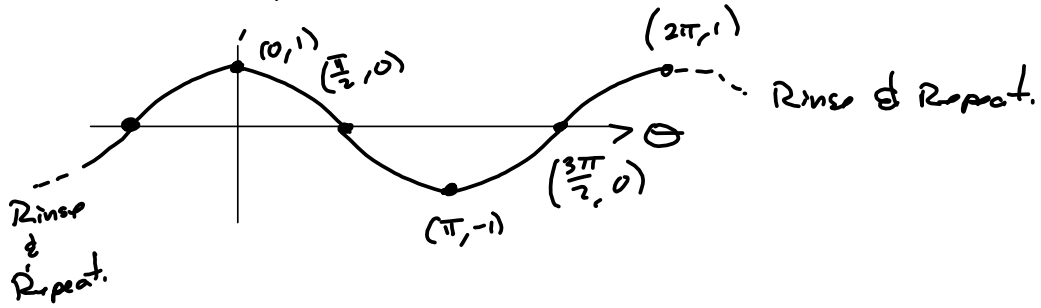


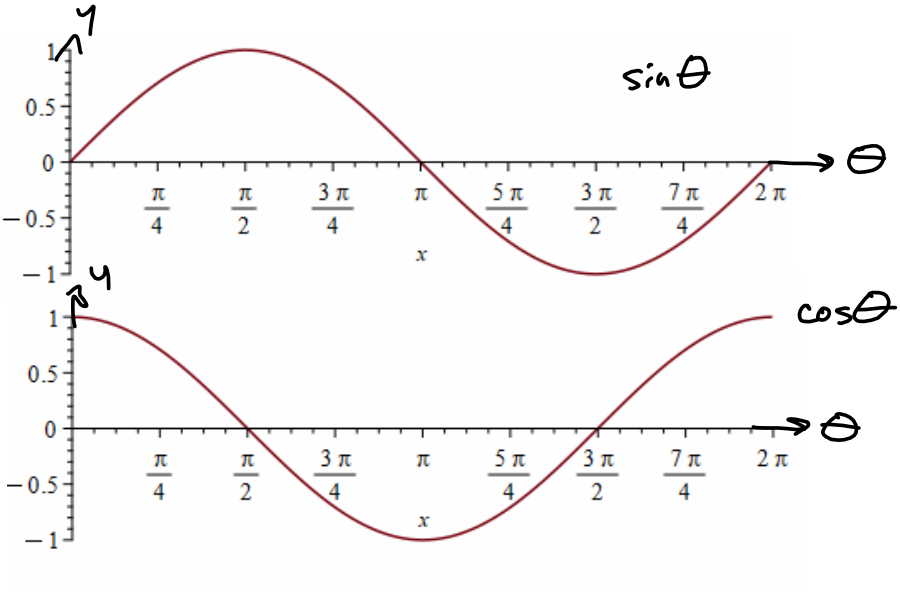
$\cos(3x^2-5x)$



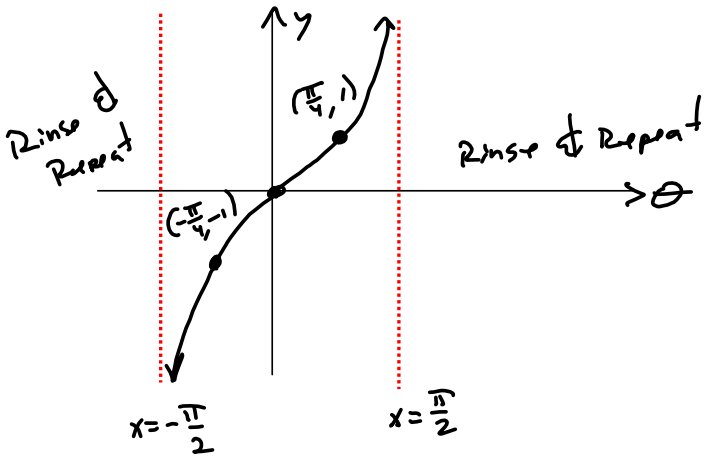


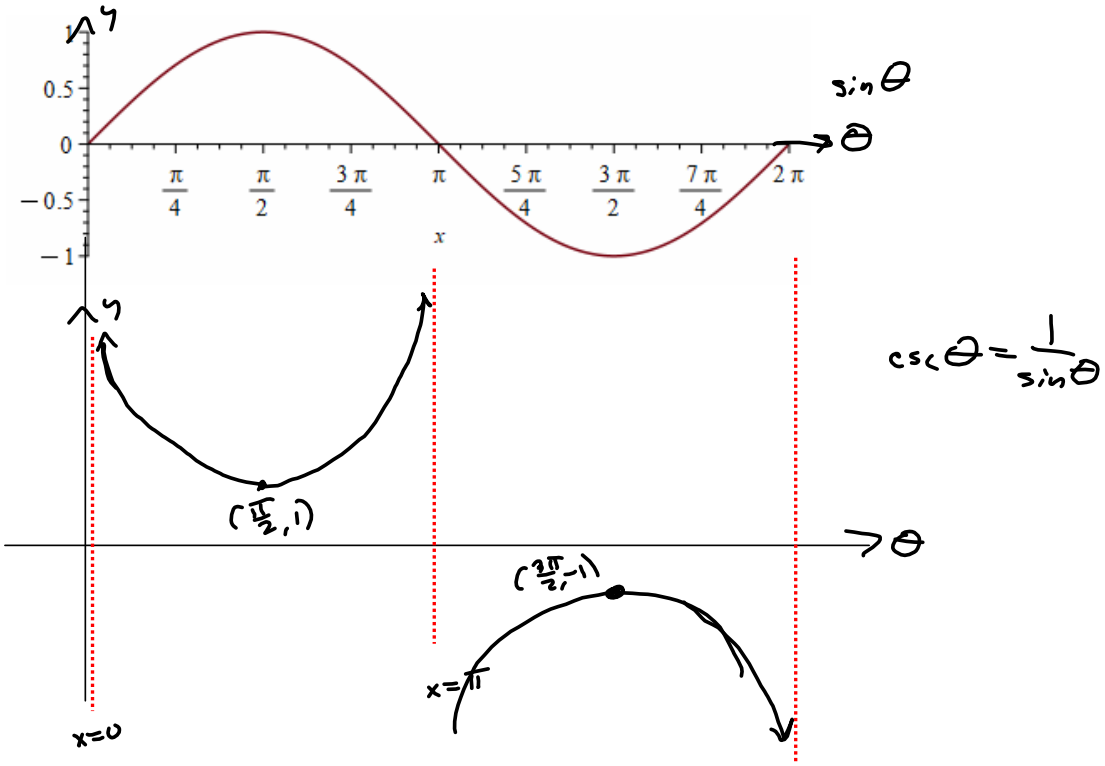
$\cos\theta$ is the x-coords





$\tan\theta = \frac{y}{x} = \frac{\sin\theta}{\cos\theta}$

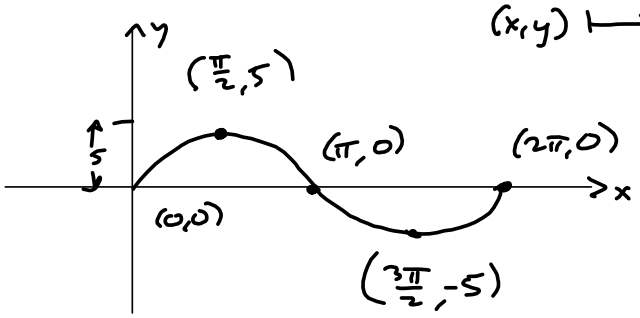


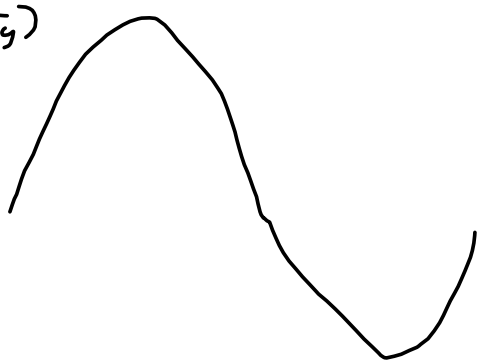

y
1
0.5
0
−0.5
−1
π/4
π/2
3π/4
π
5π/4
3π/2
7π/4
2π
x
sinθ
θ
y
(π/2, 1)
θ
(3π/2, −1)
x=π
x=0
cscθ = 1/sinθ

$a \sin(bx+c) + d$

$5\sin(x)$ $\quad a = 5 = \text{Amplitude} = \frac{1}{2}[\text{HIGH} - \text{LOW}]$

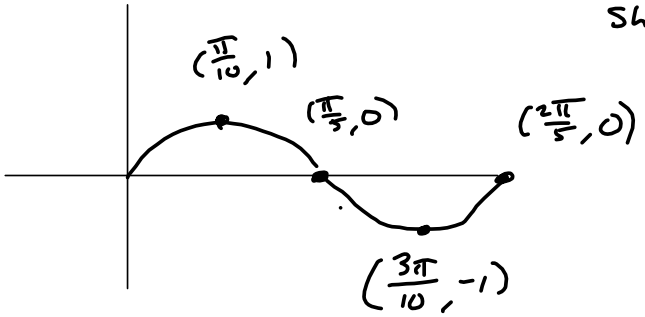
$(x,y) \longmapsto (x, 5y)$





$g(x) = \sin(5x)$ $\quad (x,y) \longmapsto (\frac{1}{5}x, y)$

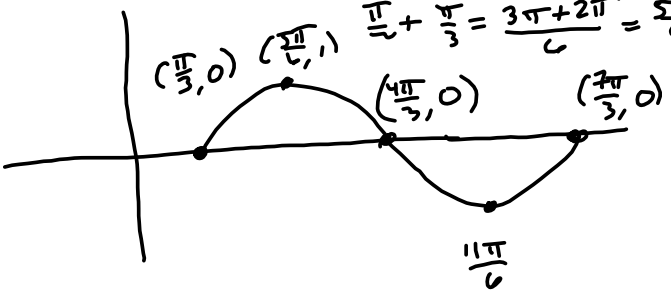
Horizontal Shrink



$h(x) = \sin(x - \frac{\pi}{3})$ $\quad (x,y) \longmapsto (x + \frac{\pi}{3}, y)$

Delay

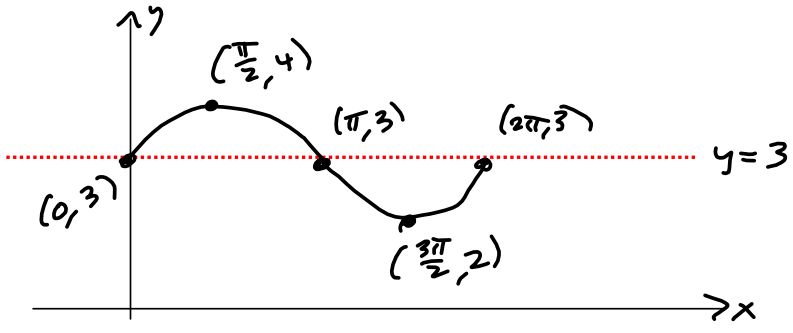
$\frac{\pi}{2} + \frac{\pi}{3} = \frac{3\pi + 2\pi}{6} = \frac{5\pi}{6}$



$\frac{3\pi}{2} + \frac{\pi}{3} = \frac{(9+2)\pi}{6} =$

$2\pi + \frac{\pi}{3} = \frac{(6+1)\pi}{3} = \frac{7\pi}{3}$

$r(x) = \sin(x) + 3$



sine, cosine : Period is 2π = wavelength (cscθ & secθ, also)

tangent, cotangent : Period is π

Graph:

$g(x) = 17\sin\left(\frac{\pi}{6}x + \frac{11\pi}{6}\right) - 10$

$= 17\sin\left(\frac{\pi}{6}(x+11)\right) - 10$ → down 10, midline $y = 10$

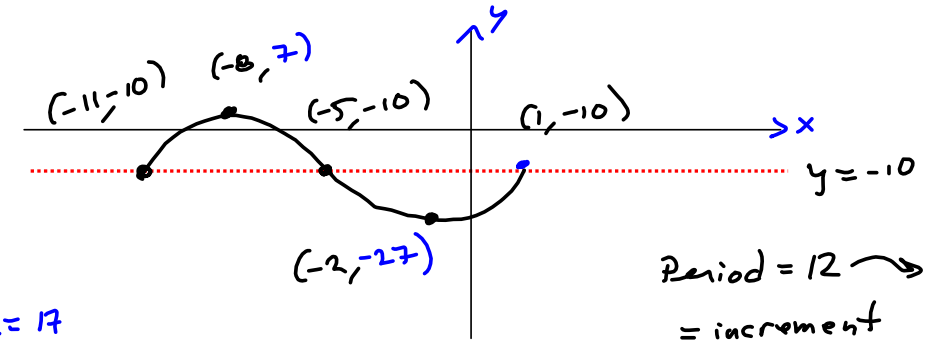
Left 11

Amp = a = 17

$\sin\left(\frac{\pi}{6}x\right)$ to find period, use period of 2π for a naked $\sin(u)$

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

$x = \frac{2\pi}{\frac{\pi}{6}} = 2\pi\left(\frac{6}{\pi}\right) = 12$ = period.



Period = 12 → $\frac{12}{4} = 3$ = increment

a = 17

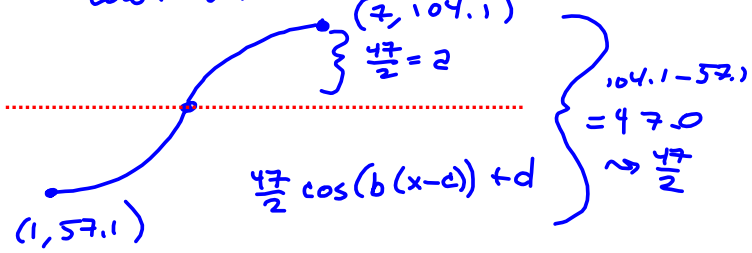
College Algebra

$\sin(x)$, $17\sin(x)$, $17\sin\left(\frac{\pi}{6}x\right)$, $17\sin\left(\frac{\pi}{6}(x+11)\right)$, $17\sin\left(\frac{\pi}{6}(x+11)\right) - 10$

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

High: (7, 104.1)
Low: (1, 57.1)



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

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

Find a trigonometric model for the temperatures in International Falls. (Round all numerical values to one decimal place.)

$I(t) =$ ____

$\frac{\text{High} + \text{Low}}{2} = \frac{161.2}{2} =$ Midline

$y = \frac{47}{2}\cos(b(x-c)) + \frac{161.2}{2}$

Period = 12 (months)

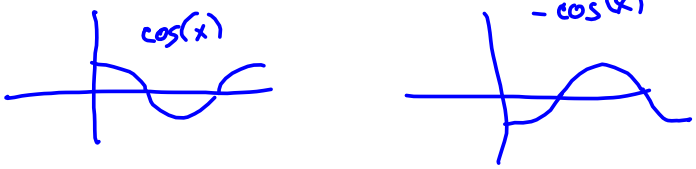
$bx = 2\pi$ when $x = 12$

$12b = 2\pi \Rightarrow$

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

$y = \frac{47}{2}\cos\left(\frac{\pi}{6}(x-c)\right) + \frac{161.2}{2}$

start @ $y =$ Bottom



$y = -\frac{47}{2}\cos\left(\frac{\pi}{6}(x-c)\right) + \frac{161.2}{2}$

$y = -\frac{47}{2}\cos\left(\frac{\pi}{6}(x-1)\right) + \frac{161.2}{2}$

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