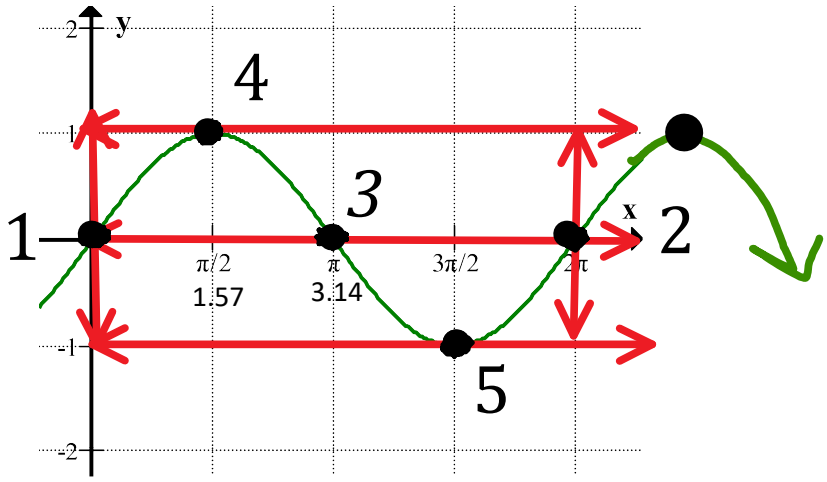
C12 - 5.0 - Trig Notes

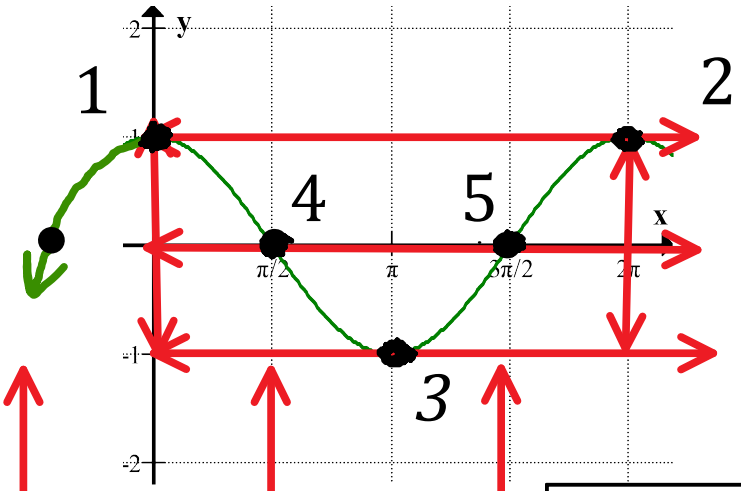
$y = \sin x$

x	y
0	0
$\frac{\pi}{2}$	1
π	0
$\frac{3\pi}{2}$	-1
2π	0



$y = \cos x$

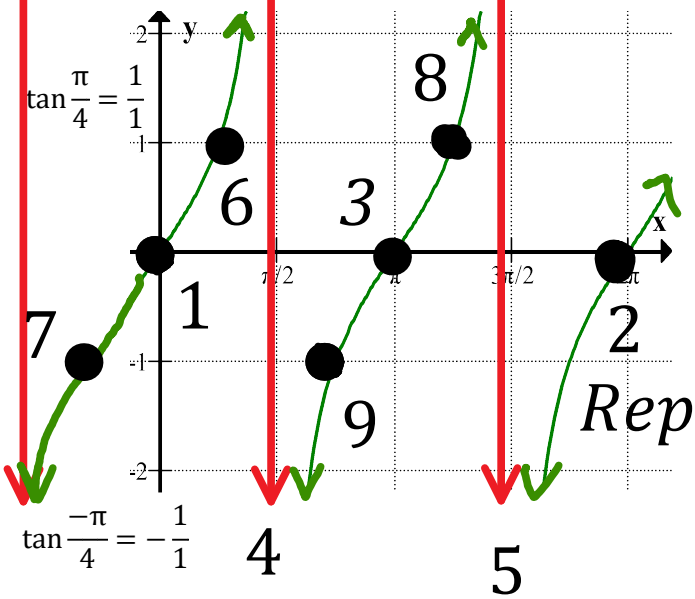
x	y
0	1
$\frac{\pi}{2}$	0
π	-1
$\frac{3\pi}{2}$	0
2π	1



$y = \tan x$

x	y
0	0
$\frac{\pi}{4}$	1
$\frac{\pi}{2}$	und
$\frac{3\pi}{4}$	-1
π	0

Tan is Zero when sin is zero
Tan is UND when cos is zero



$$tanx = \frac{sinx}{cosx}$$

x	y
$\frac{\pi}{4}$	1
$-\frac{\pi}{4}$	-1

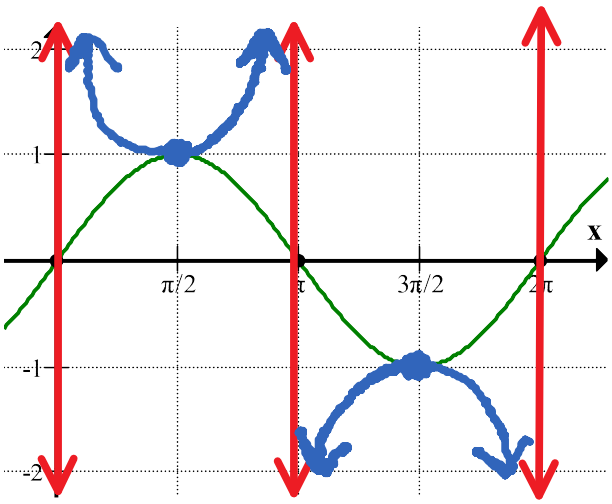
Special Triangles
ASTC

C12 - 5.0 - TOV Radians cscx,secx,cotx TOV Graphs Notes

$y = \csc x$

x	y
0	und
$\frac{\pi}{2}$	1
π	und
$\frac{3\pi}{2}$	-1
2π	und

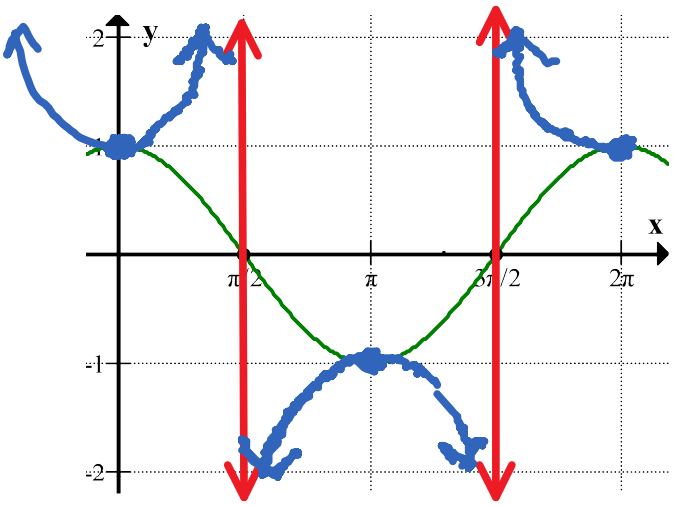
Pt.
(0,0)
$(\frac{\pi}{2},1)$
$(\pi,0)$
$(\frac{3\pi}{2},-1)$
$(2\pi,0)$



$y = \sec x$

x	y
0	1
$\frac{\pi}{2}$	und
π	-1
$\frac{3\pi}{2}$	und
2π	1

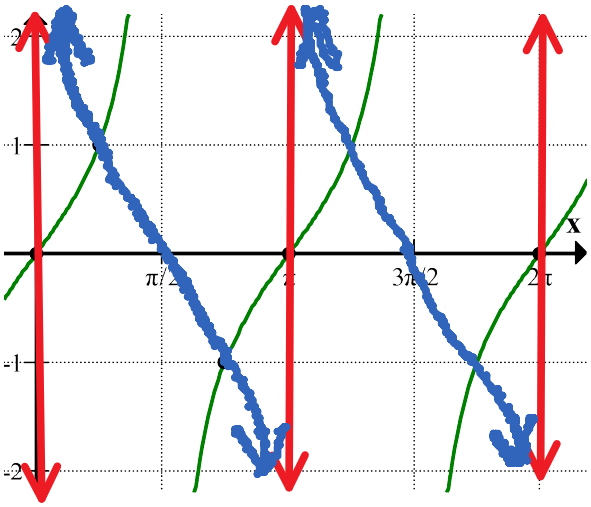
Pt.
(0,1)
$(\frac{\pi}{2},0)$
$(\pi,-1)$
$(\frac{3\pi}{2},0)$
$(2\pi,1)$



$y = \cot x$

x	y
0	und
$\frac{\pi}{4}$	1
$\frac{\pi}{2}$	0
$\frac{3\pi}{4}$	-1
π	und

Pt.
(0,0)
$(\frac{\pi}{4},1)$
$(\frac{\pi}{2},\text{und})$
$(\frac{3\pi}{4},-1)$
$(\pi,0)$



Cot is Zero when cos is zero
Cot is UND when sin is zero

$$cotx = \frac{cosx}{sinx}$$

C12 - 5.0 - Trig Notes

Graph : (Two Cycles)

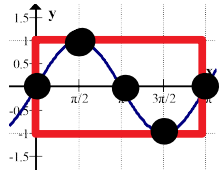
$y = a\sin(b(x-c)) + d$

$$y = -2\sin\left(2\left(x - \frac{\pi}{2}\right)\right) + 1$$

(a, b, c, d)

Box Model

Sine Graph



4 Parts!

Steps :
1) d
2) a
3) c
4) b

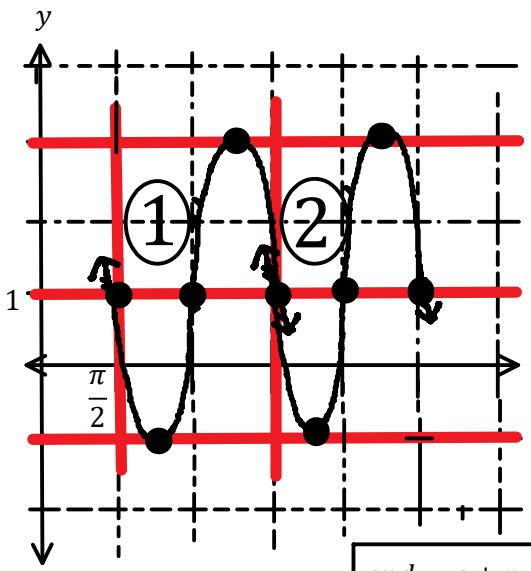
$\frac{1\pi}{2}, \frac{2\pi}{2}, \frac{3\pi}{2} \ldots$

$1\ square = \frac{\pi}{2}$

$p = 2\ squares$

$p = \frac{\pi}{2} \times 2 = \pi$

Makes Sense!



$d + |a| = 4$

$d = 1$

$d - |a| = 4$

Domain : $x \in \mathbb{R}$

Range $-1 \le y \le 3$

$c = \frac{\pi}{2}$ $\quad end = \frac{3\pi}{2}$

$end = c + p$

$= \frac{\pi}{2} + \pi$

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

$p = \frac{2\pi}{b}$

$p = \frac{2\pi}{2}$

$p = \pi$

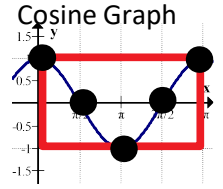
Find Equation :

$y = a\cos(b(x-c)) + d$

(a, b, c, d)

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

Cosine Graph



4 Parts

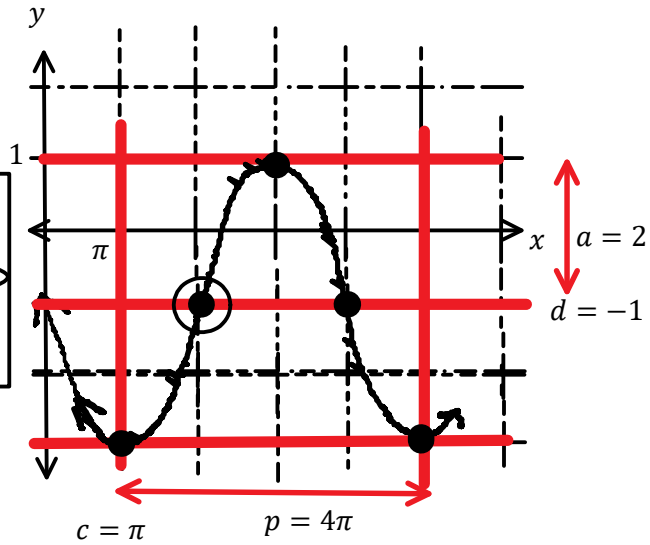
$1\ square = \pi$

$p = 4\ squares$

$p = \pi \times 4 = 4\pi$

$p = 5\pi - \pi$

$p = 4\pi$



$p = \frac{2\pi}{b}$

$b = \frac{2\pi}{p}$

$b = \frac{2\pi}{4\pi}$

$b = \frac{1}{2}$

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

$y = +2\sin\left(\frac{1}{2}(x - 2\pi)\right) - 1$

$y = -2\sin\left(\frac{1}{2}(x)\right) - 1$

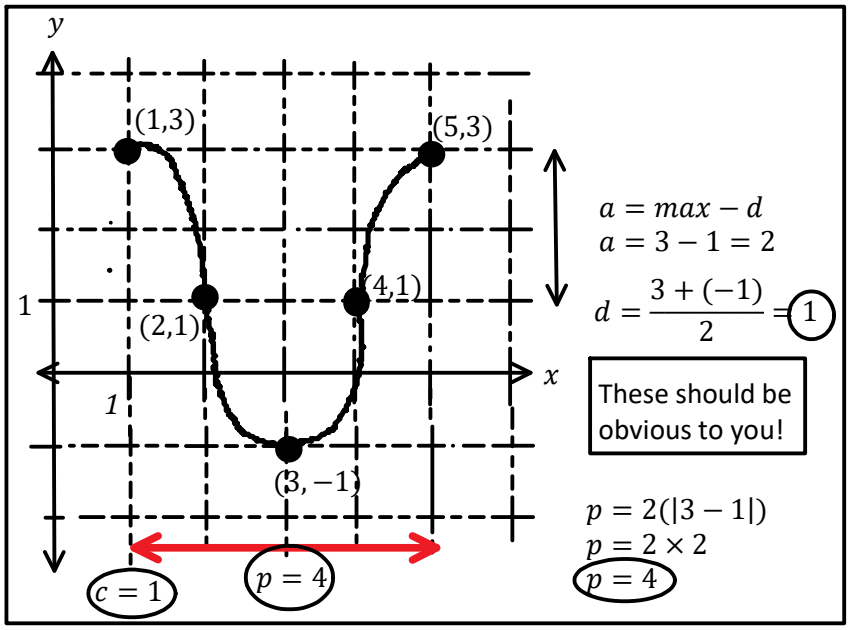
They are all the same!

C12 - 5.0 - Trig Graph 2 Pts. Notes

Find Equation : Given Max@ $(\mathbf{1},\mathbf{3})$ & $\boldsymbol{Min}$ @ $(\mathbf{3},-\mathbf{1})$

$$y = +2\cos\left(\frac{2\pi}{4}(x-1)\right)+1$$

$$y = +2\sin\left(\frac{2\pi}{4}(x-4)\right)+1$$



$a = max - d$

$a = 3 - 1 = 2$

$d = \frac{3+(-1)}{2} = 1$

These should be obvious to you!

$p = 2(|3-1|)$

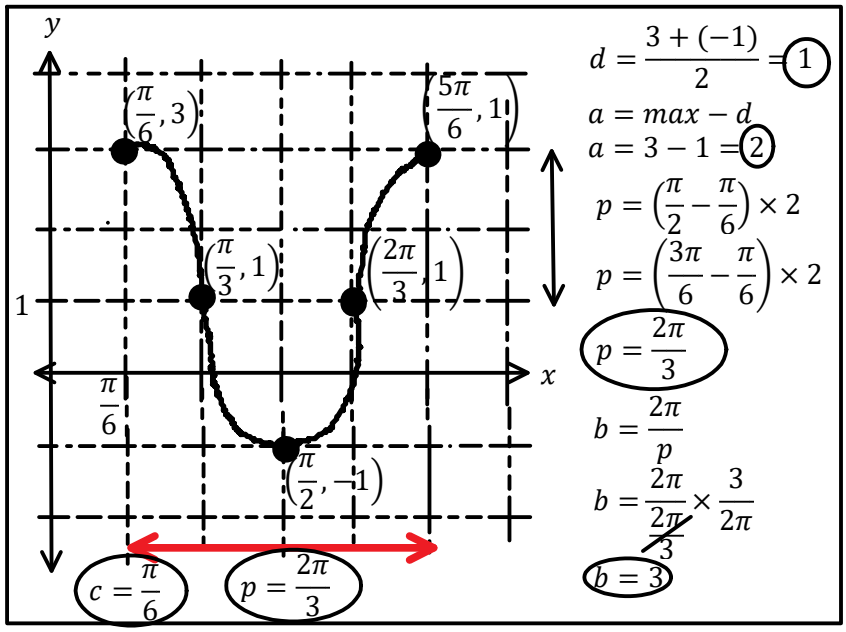
$p = 2 \times 2$

$p = 4$

Find Equation : Given Max@ $\left(\frac{\pi}{6},\mathbf{3}\right)$ & $\boldsymbol{Min}$ @ $(\frac{\pi}{2},-\mathbf{1})$

$$y = +2\cos\left(3\left(x-\frac{\pi}{6}\right)\right)+1$$

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



$d = \frac{3+(-1)}{2} = 1$

$a = max - d$

$a = 3 - 1 = 2$

$p = \left(\frac{\pi}{2} - \frac{\pi}{6}\right) \times 2$

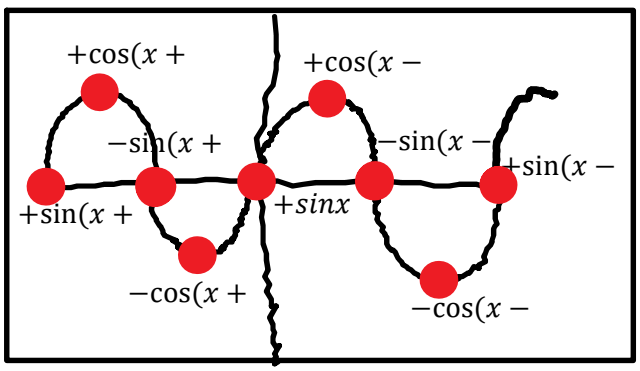
$p = \left(\frac{3\pi}{6} - \frac{\pi}{6}\right) \times 2$

$p = \frac{2\pi}{3}$

$b = \frac{2\pi}{p}$

$b = \frac{2\pi}{2\pi} \times \frac{3}{2\pi}$

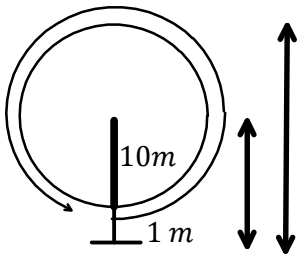
$b = 3$



C12 - 5.0 - Trig Notes

A Ferris wheel with radius 10 m is 1 m off the ground and takes 16 seconds for one complete revolution. Graph the height of a passenger, starting at the bottom, and write the sinusoidal equation. How high at 6 second? How long above 6m in one cycle? & No Calculator!

$let\ h = height\ (m)$
$let\ t = time\ (s)$



t	h
0	1
4	11
8	21
12	11
16	1

$p = 16\ s$

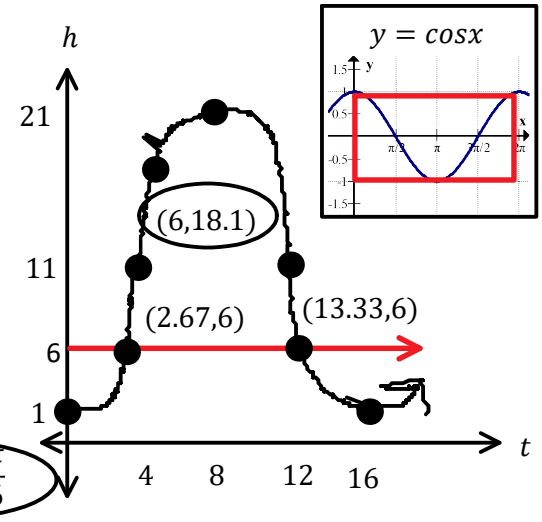
$\frac{16}{4} = 4$

$p = \frac{2\pi}{b}$

$b = \frac{2\pi}{p}$

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

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



$y = a\cos(b(x-c)) + d$

$h = -10\cos\left(\frac{\pi}{8}(t)\right) + 11$

$h = -10\cos\left(\frac{\pi}{8}(6)\right) + 11$

$h = 18.1m$

Sub 6 in for t. (OR) Graph 2nd Calc Value

$y_1 = -10\cos\left(\frac{\pi}{8}(t)\right) + 11$

$y_2 = 6$

$t = 10.7\ seconds$

Find Intersection, and Subtract, (OR) Algebra and Inverse

$13.333 - 2.666 = 10.666$

$\frac{10 + 11\sqrt{2}}{\sqrt{2}} = 18.1$ *Exact Value*

$h = +10\sin\left(\frac{\pi}{8}(t-4)\right) + 11$

$6 = -10\cos\left(\frac{\pi}{8}(t)\right) + 11$

$cosm = \frac{1}{2}$ $\quad m = \frac{\pi t}{8}$

...

$t = \frac{8}{3}, \frac{40}{3}$ *Exact Value*

Graph and find Equation. High tide depth 18m at 8 am. Low tide depth 8 m at 1:24 pm.

$Max: (8, 18)\quad Min: (13.4, 8)$

$1\ pm = 13\ O'clock$

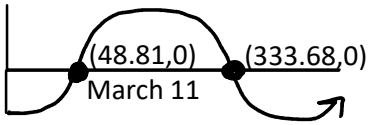
$\frac{24min}{60min} = 0.4\ hr$

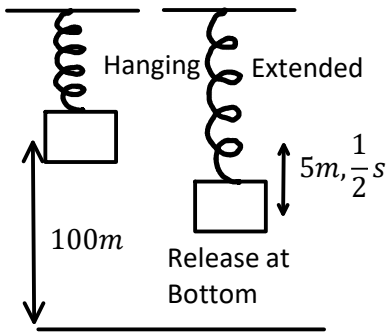
...

$d = +5\cos\left(\frac{2\pi}{10.8}(x-8)\right) + 13$

Daily Temperature>0?

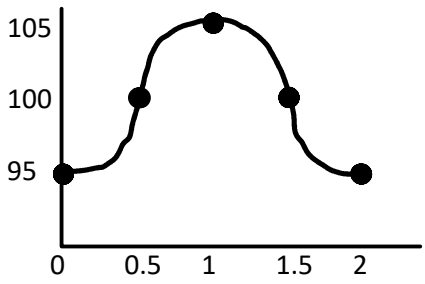
$y = 35\sin\left(\frac{2\pi}{365}(d-100)\right) + 27$





$p^* = \frac{1}{2} \times 4 = 2$ $\quad \frac{2}{4} = \frac{1}{2}$

t	h
0	95
0.5	100
1	105
1.5	100
2	95



$h = -5\cos\left(\frac{2\pi}{2}(t)\right) + 100$