October 18

SWBAT:

Evaluate inverse functions

1) $y = 4\sec(2x)$

Amplitude = 4

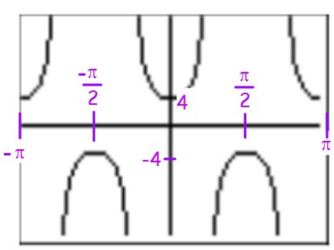
Vertical Shift = 0

New Range:

$y \leq -4,\ y \geq 4$

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

Horizontal Shift = 0



2) $y = 3\sec(\pi x)$

Amplitude = 3

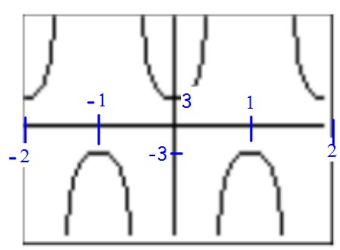
Vertical Shift = 0

New Range:

$y \leq -3,\ y \geq 3$

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

Horizontal Shift = 0



3) $y = 5\csc\left(\frac{\pi x}{4}\right)$

Amplitude = 5

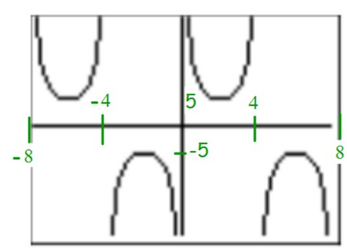
Vertical Shift = 0

New Range:

$y \leq -5,\ y \geq 5$

Period = $\frac{2\pi}{(\pi/4)} = 8$

Horizontal Shift = 0



4) $y = 3 + \sec(x)$

Amplitude = 1

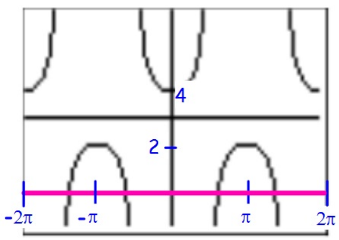
Vertical Shift = 3

New Range:

$y \le 2, y \ge 4$

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

Horizontal Shift = 0



5) $y = \csc(x) - 2$

Amplitude = 1

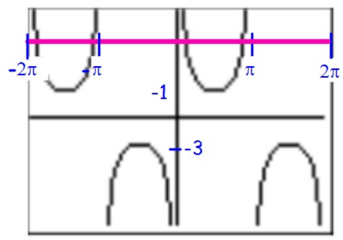
Vertical Shift = -2

New Range:

$y \le -3, y \ge -1$

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

Horizontal Shift = 0



6) $y = \csc(x) + 4$

Amplitude = 1

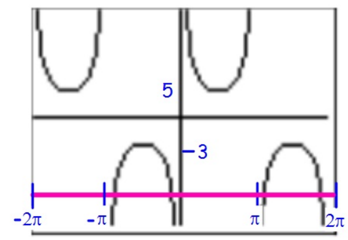
Vertical Shift = 4

New Range:

$y \le 3, y \ge 5$

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

Horizontal Shift = 0



7) $y = \csc\left(x - \frac{\pi}{4}\right)$

Amplitude = 1

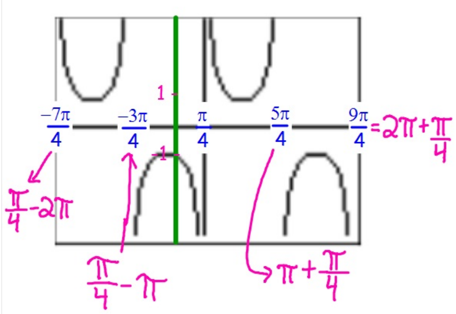
Vertical Shift = 0

New Range:

$y \le -1, y \ge 1$

Period = 2π

Horizontal Shift = $\frac{-c}{b} = \frac{-(-\pi/4)}{1} = \frac{\pi}{4}$



8) $y = \sec\left(x + \frac{\pi}{2}\right)$

Amplitude = 1

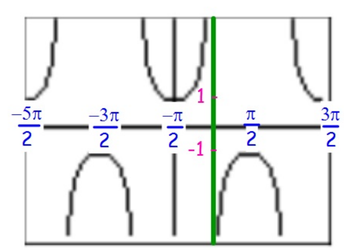
Vertical Shift = 0

New Range:

$y \le -1, y \ge 1$

Period = 2π

Horizontal Shift = $\frac{-c}{b} = \frac{-(\pi/2)}{1} = \frac{-\pi}{2}$



9) $y = \csc(4\pi x - \pi)$

Amplitude = 1

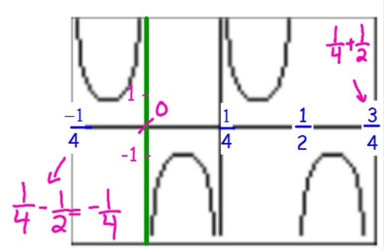
Vertical Shift = 0

New Range:

$y \le -1, y \le 1$

Period = $(2\pi)/(4\pi) = 1/2$

Horizontal Shift = $\frac{-c}{b} = \frac{-(-\pi)}{4\pi} = \frac{1}{4}$



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

Amplitude = -2

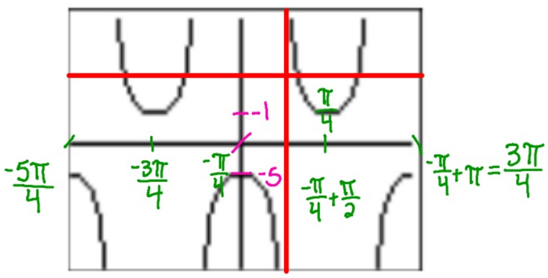
Vertical Shift = -3

New Range:

$y \le -5, y \ge -1$

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

Horizontal Shift = $\frac{-(\pi/2)}{2} = \frac{-\pi}{4}$



11) $y = 3\csc\left(\frac{\pi x}{4} - 1\right) + 2$

Amplitude = 3

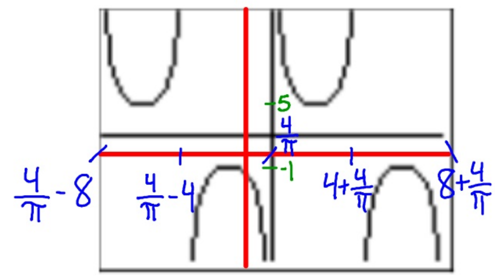
Vertical Shift = 2

New Range:

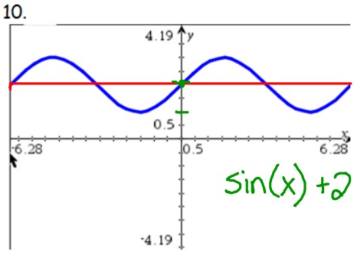
$y \le -1, y \ge 5$

Period = $\frac{2\pi}{(\pi/4)} = 8$

Horizontal Shift = $\frac{-(-1)}{(\pi/4)} = \frac{4}{\pi}$



10.



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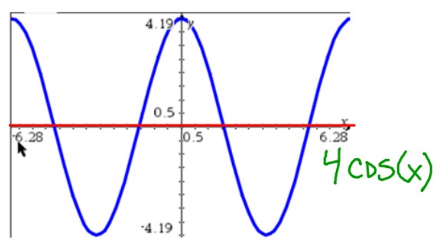

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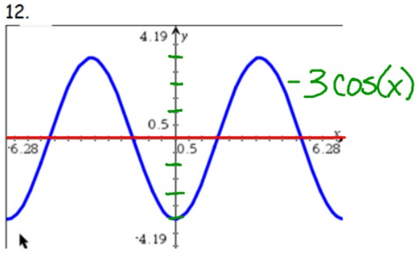

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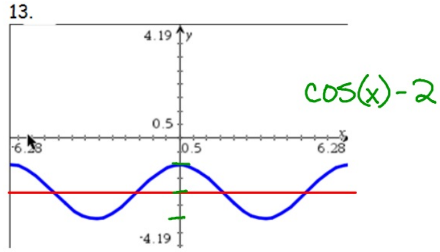

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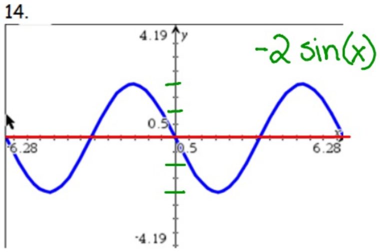

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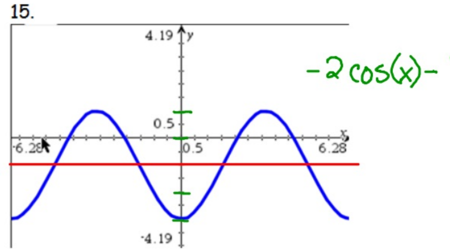

$$y = a\sin(bx + c) + d$$

a = amplitude

d = vertical shift

$$\text{Period} = \frac{2\pi}{b}$$

$$\text{h. shift} = \frac{-c}{b}$$

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1) Amplitude = 3
Vertical Shift = 1
Period = π
Phase Shift = 0

$y = 3\sin(2x) + 1$

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

2) Amplitude = 1
Vertical Shift = 0
Period = 2
Phase Shift = 1

$y = \sin(\pi x - \pi)$

$\frac{-c}{b} = \frac{-c}{\pi} = 1$

$c = -\pi$

3) Amplitude = 5
Vertical Shift = -2
Period = 15
Phase Shift = 3

$3 = \frac{-c}{\frac{2\pi}{15}}$

$-3\left(\frac{2\pi}{15}\right) = c$

$5\sin\left(\frac{2\pi}{15}x - \frac{6\pi}{15}\right) - 2$

$\frac{2\pi}{5}$

4) Amplitude = 2
Vertical Shift = 0
Period = 4π
Phase Shift = 0

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

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

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

5) Amplitude = 3
Vertical Shift = -1
Period = 5
Phase Shift = 3

$y = 3\cos\left(\frac{2\pi}{5}x - \frac{6\pi}{5}\right) - 1$

6) Amplitude = 2
Vertical Shift = 4
Period = 25
Phase Shift = 10
Reflection across the x-axis

$-2\cos\left(\frac{2\pi}{25}x - \frac{20\pi}{25}\right) + 4$

$25 = \frac{2\pi}{b}$

$25b = 2\pi$

$b = \frac{2\pi}{25}$

$10 = \frac{-c}{\frac{2\pi}{25}}$

$-10\left(\frac{2\pi}{25}\right) = c$

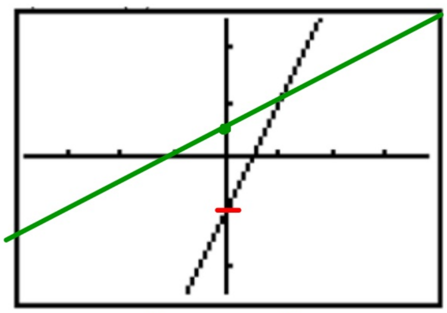
$\frac{-20\pi}{25} = \frac{-4\pi}{5}$

Two functions, *f(x)* and *g(x)* are said to be inverses of each other if $f(g(x))=g(f(x))=x$

(for all values of *x* where the expressions are defined).

$f(x)=x^2$ $g(x)=\sqrt{x}$ $f(g(x))=f(\sqrt{x})=(\sqrt{x})^2=x$

The graph of *f(x)* is shown below



$y=2x-1$

$x=2y-1$

$x+1=2y$

$y=\frac{x+1}{2}=\frac{x}{2}+\frac{1}{2}$

(a) Write an equation for *f(x)* $f(x)=2x-1$

(b) Algebraically find the *g(x)*, where *g(x)* is the inverse of *f(x)* $g(x)=\frac{1}{2}x+\frac{1}{2}$

(c) In the window, sketch the graph of *y = g(x)*

(d) What is the *y*-intercept of *f*? $(0,-1)$

(e) What is the *x*-intercept of *g*? $(-1,0)$

(f) What is the *x*-intercept of *f*? $(.5,0)$

(g) What is the *y*-intercept of *g*? $(0,.5)$

(h) How do the domain and range of inverses relate to each other?

they flip

domain of f = range of g

range of f = domain of g

	x	-1	0	1	2	3
y →	*n(x)*	0	-2	2	-1	1

	x	-1	0	1	2	3
y →	*r(x)*	2	-1	3	1	-2

(a) $r^{-1}(-1) \Rightarrow r(x)=-1 \rightarrow x=0$

(b) $n^{-1}(2) =$ 1

(c) $r^{-1}(-1)+n^{-1}(-1) =$ 2

(d) $r(n^{-1}(2)) =$

$n^{-1}(2)=1$

$r(1)=3$

(e) $r^{-1}(r(3)) =$

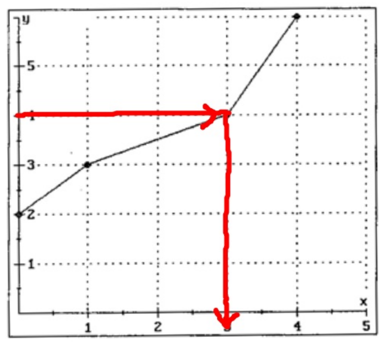
$r(3)$

$r^{-1}(-2)=3$

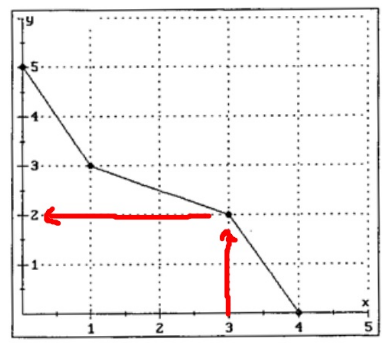
(f) $r(r^{-1}(1)) =$ 1

(g) $n(n^{-1}(-1)) =$ -1

(h) $n^{-1}(n(2)) =$ 2



$b(x)$



$c(x)$

$c(3)=2$

(a) $b^{-1}(4) =$ 3

(b) $c^{-1}(3) =$

(c) $b^{-1}(c(1)) =$

(d) $c^{-1}(c(1)) =$

(e) $c^{-1}(b(4)) =$

(f) $c(b^{-1}(4)) =$

(g) $b(c^{-1}(0)) =$

(h) $b^{-1}(b(2)) =$