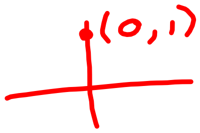
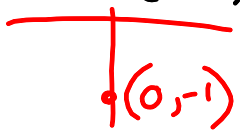
<u>Review</u>: Evaluate the following trigonometric expressions.

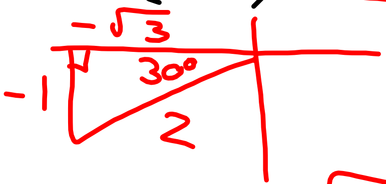
$\tan\frac{5\pi}{2} = \boxed{\text{undefined}}$



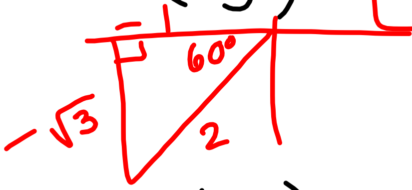
$\sec\left(\frac{3\pi}{2}\right) = \boxed{\text{undefined}}$



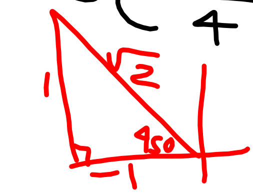
$\sin\left(\frac{-5\pi}{6}\right) = \boxed{\frac{-1}{2}}$



$\csc\left(\frac{4\pi}{3}\right) = \boxed{-\frac{2}{\sqrt{3}}}$



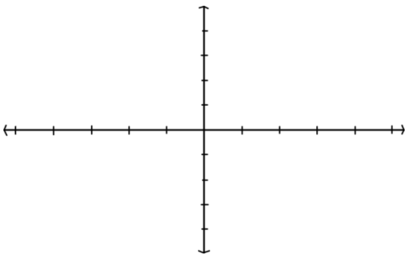
$\cos\left(-\frac{5\pi}{4}\right) = \boxed{\frac{-1}{\sqrt{2}}}$



$\cot\left(\frac{-9\pi}{4}\right) = \boxed{-1}$

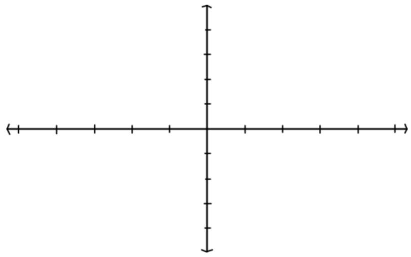
amplitude:

period:



amplitude:

period:



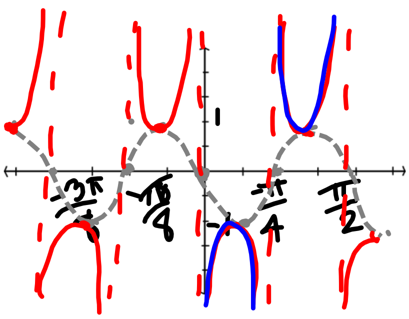
$y = -\csc(4x)$

"amplitude:"

1

period:

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



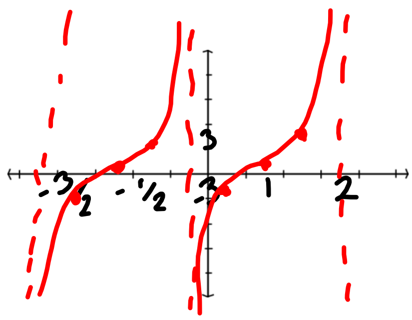
$y = -3\cot\frac{\pi}{2}x$

"amplitude:"

3

period:

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



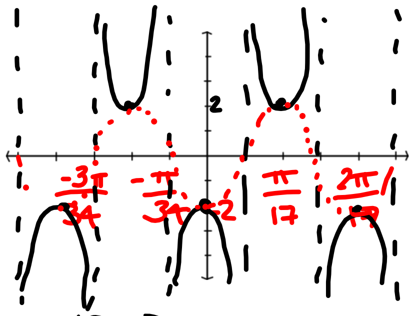
$y=-2\sec 17x$

amplitude:

2

period:

$\frac{2\pi}{17}$



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

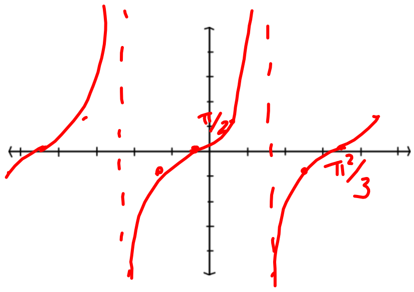
amplitude:

$\pi/2$

period:

$\frac{\pi}{3/\pi}=\frac{\pi}{1}\cdot\frac{\pi}{3}$

$=\pi^2/3$



$y=-\frac{2}{3}\sin\left(\frac{5}{\sqrt{2}}x\right)$

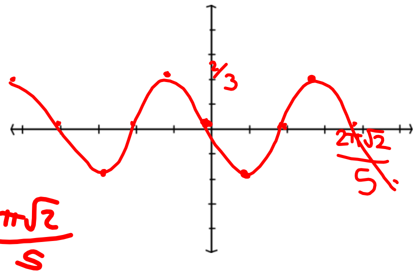
amplitude:

$2/3$

period:

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

$=\frac{2\pi}{1}\cdot\frac{\sqrt{2}}{5}=\frac{2\pi\sqrt{2}}{5}$



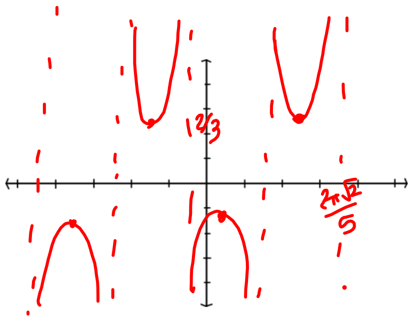
$y=-\frac{2}{3}\csc\left(\frac{5}{\sqrt{2}}x\right)$

amplitude:

$2/3$

period:

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



Goal: Transform a trigonometric function of the form $y=f(x)$ to one of the form $y=af(bx+c)+d$ by observing changes in amplitude and period, as well as horizontal and vertical shifts.

Recall:

- Constants that are multiplied (divided) result in a stretching/scaling of the graph (amplitude/period changes), that we show by changing the scale on our axes
- Constants that are added (subtracted) result in shifting of the graph
- Constants outside the function (a & d) affect it vertically, as we would expect
- Constants inside the function (b & c) affect it horizontally, opposite of what we would expect

$y=af(bx)$ ✓ scaling

$y=f(x+c)+d$ shifting

$y = f(x+c)+d$ shifting

outside - vertically as we would expect

inside - horizontally, opposite

d = vertical shift

$d>0$ up

$d<0$ down

c = horizontal shift

$c>0$ left

$c<0$ right

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

amplitude:

1

period:

2π

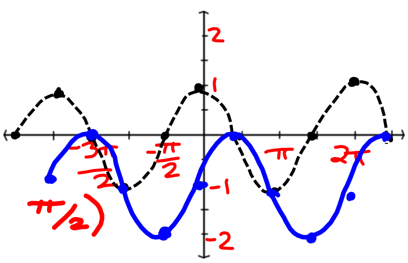
horiz. shift:

right $\frac{\pi}{2}$

(phase shift $\pi/2$)

vert. shift:

down 1



$y=\cot(x+\frac{\pi}{2})-\frac{1}{2}$

amplitude:

1

period:

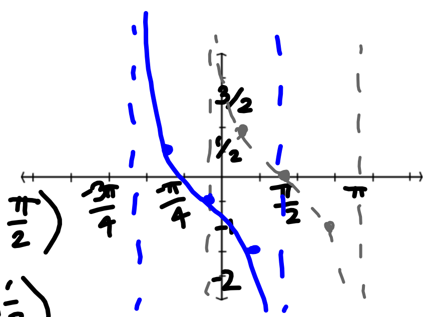
π

horiz. shift:

$-\frac{\pi}{2}$ (left $\frac{\pi}{2}$)

vert. shift:

$-\frac{1}{2}$ (down $\frac{1}{2}$)

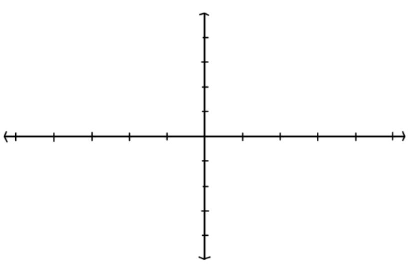


amplitude:

period:

horiz. shift:

vert. shift:

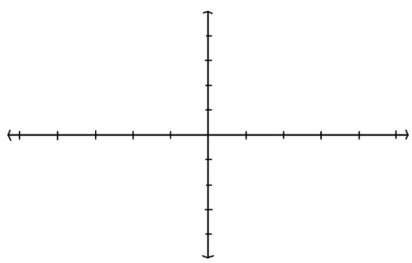


amplitude:

period:

horiz. shift:

vert. shift:



$\sqrt{x} \Rightarrow 4$

16

$\sqrt{x+2} \Rightarrow 4$

14

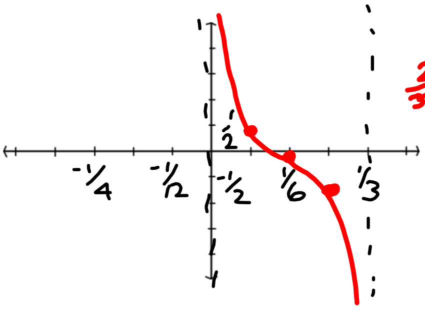
$y = \frac{1}{2}\cot 3\pi x$

amplitude:
$\frac{1}{2}$

period:
$\frac{\pi}{3\pi} = \frac{1}{3}$

horiz. shift:
none
(0)

vert. shift:
none
(0)



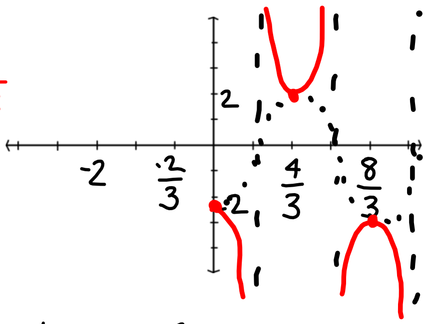
$y = -2\sec\frac{3\pi}{4}x$

amplitude:
2

period:
$\frac{2\pi}{3\pi/4} = \frac{2\pi}{1}\cdot\frac{4}{3\pi} = \frac{8}{3}$

horiz. shift:
none
(0)

vert. shift:
none
(0)



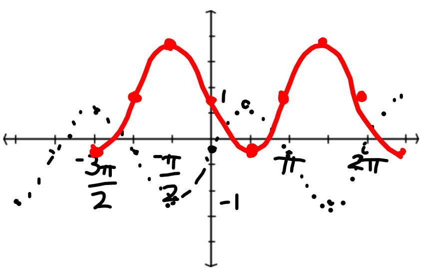
$y = \sin(x-\pi)+1$

amplitude:
1

period:
2π

horiz. shift:
π
(right π)

vert. shift:
1
(up 1)



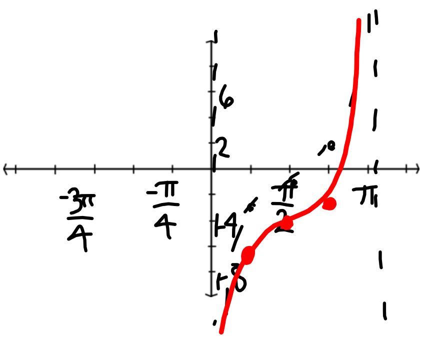
$y = -2\cot(x) - 4$

amplitude:
2

period:
π

horiz. shift:
none
(0)

vert. shift:
-4
(down 4)



<u>Homework #4</u> (due Fri, 9/5)

- Graphing worksheets, problems #1-60
- <u>5.5</u> #55-60 all — write an equation given a graph (sin & cos)
  #77-84 all — write an equation given amplitude and period
- <u>5.6</u> #49-54 all — write an equation given a graph (tan, cot, sec, csc)
  #63-70 all — write an equation given ("amplitude" 1 and) period
- <u>5.7</u> #53-58 all — graph sum functions
  #59-64 all — write an equation given a graph
  #87-92 all — write an equation given amplitude, period, & shifts