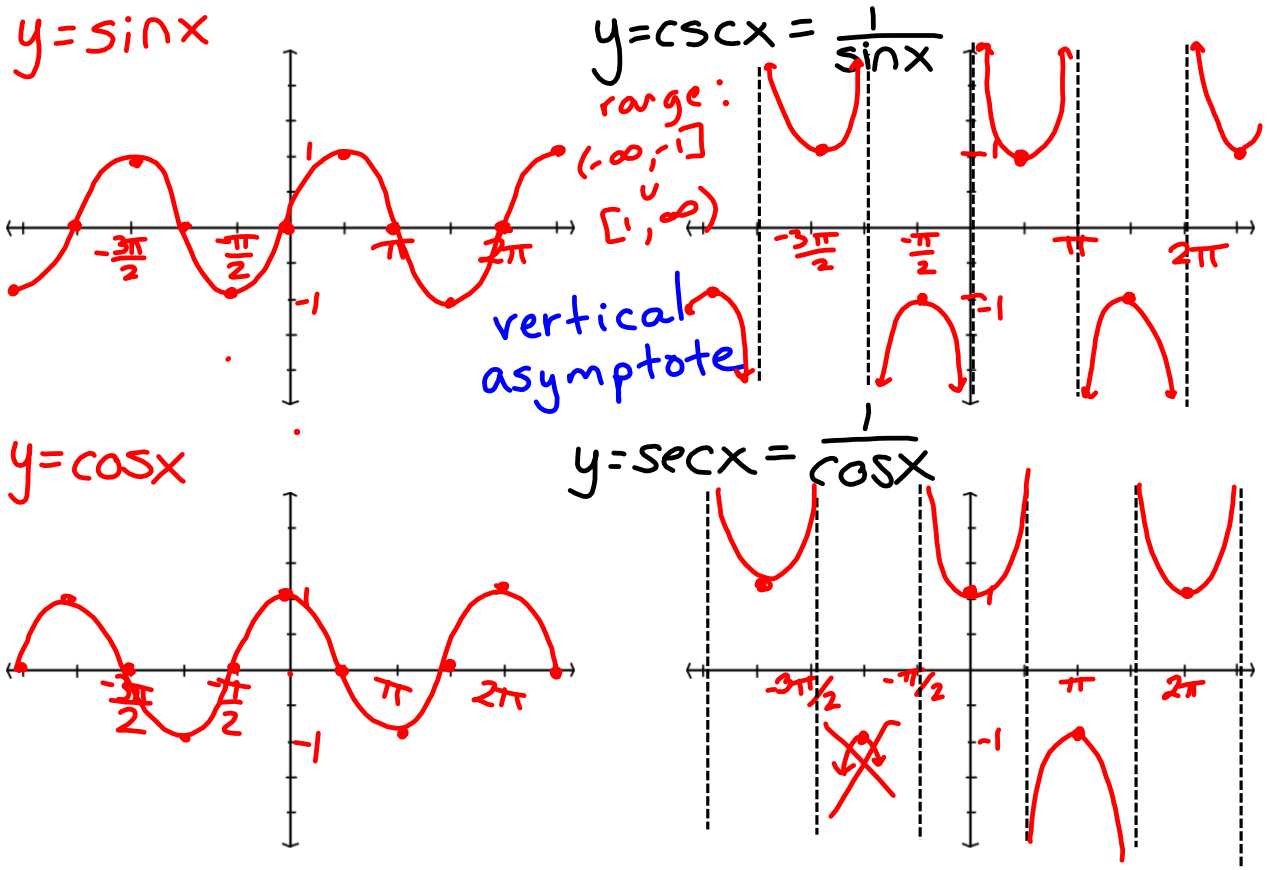
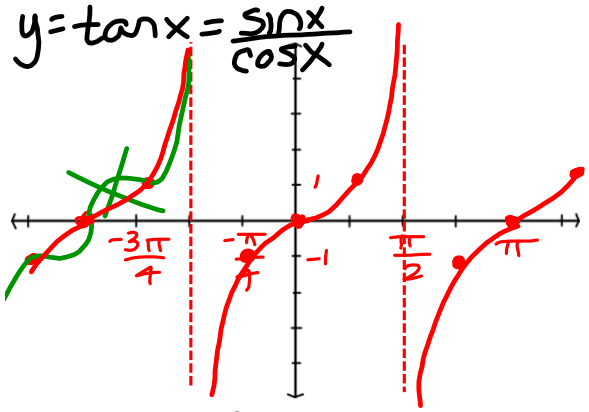


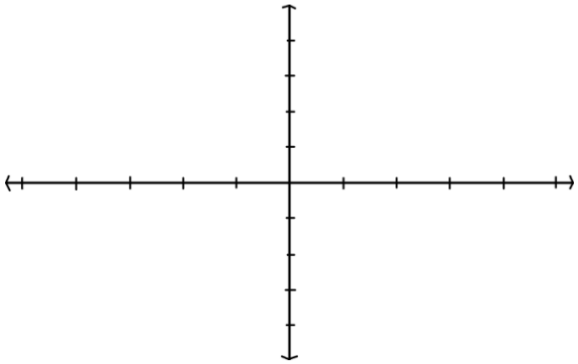
range of sin & cos : $[-1, 1]$

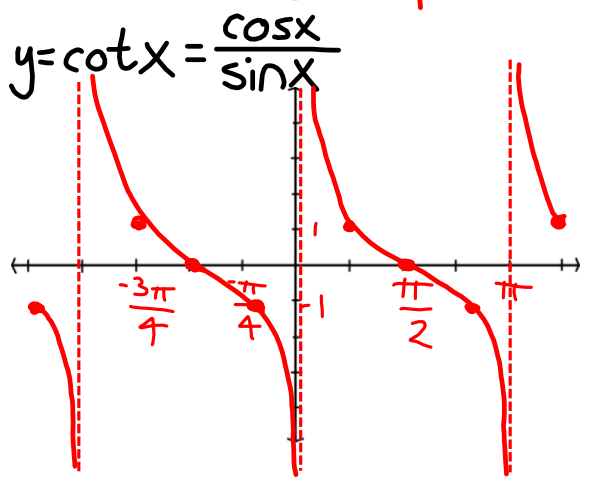
$\frac{1}{\sin x}$ & $\frac{1}{\cos x}$

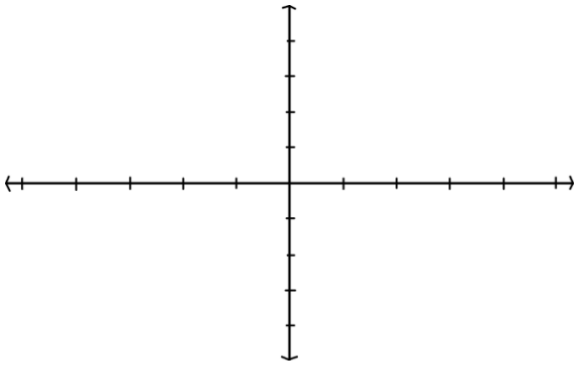
$\frac{1}{1/2} = 2$

$\frac{1}{-1/100000} = -100000$









$y = f(x)$

Goal:

$y = af(bx+c)+d$

$y = f(x)+g(x)$

$y = af(bx)$

multiplication always results in a stretch of the graph.

constants applied outside the function affect it vertically as we expect; inside - horizontally, opposite of what we would expect

$$\text{amplitude} = \frac{\text{max value} - \text{min value}}{2}$$

for $y = a \sin bx$

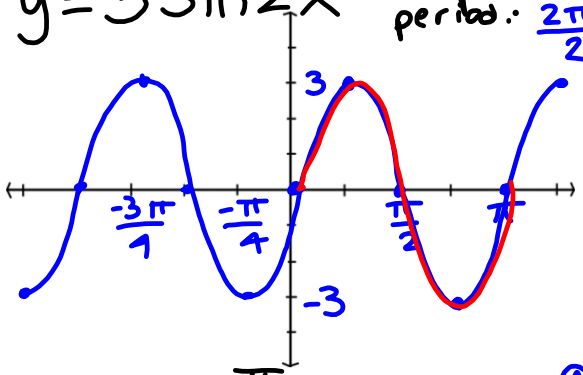
$\underline{\text{amplitude}} = |a|$

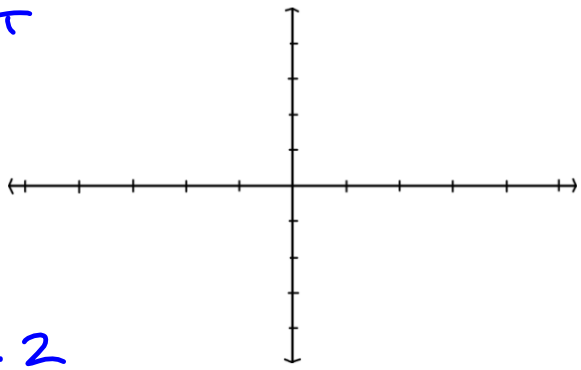
If $a < 0$, vertical flip

$$\underline{\text{period}} = \frac{\text{original period } (2\pi \text{ or } \pi)}{|b|}$$

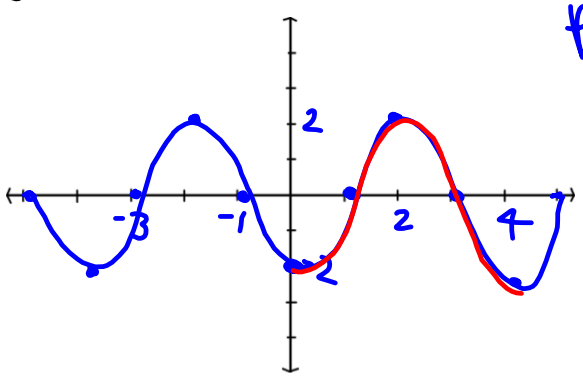
If $b < 0$, horizontal flip

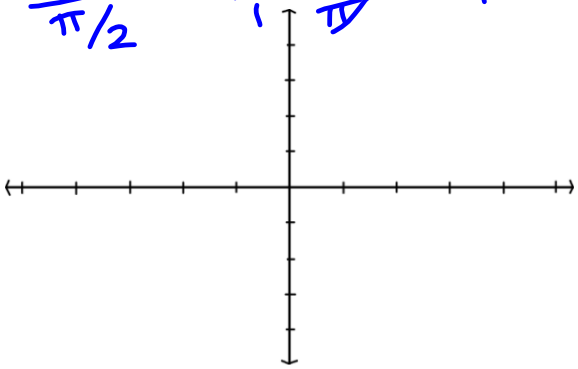
$y = 3\sin 2x$ amp: 3 period: $\frac{2\pi}{2} = \pi$



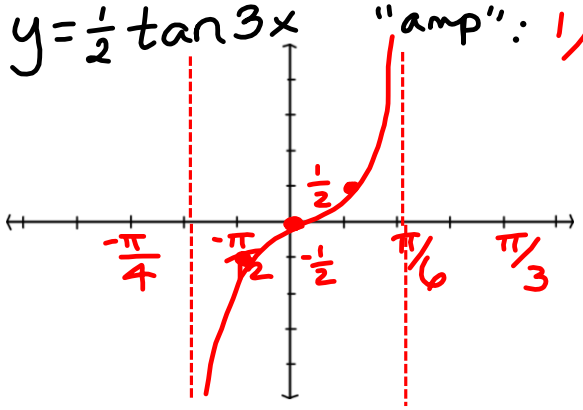


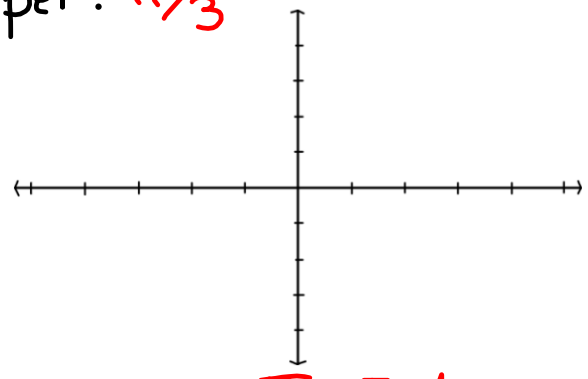
$y = -2\cos\frac{\pi}{2}x$ amp: 2 per: $\frac{2\pi}{\pi/2} = \frac{2\pi}{1}\cdot\frac{2}{\pi} = 4$



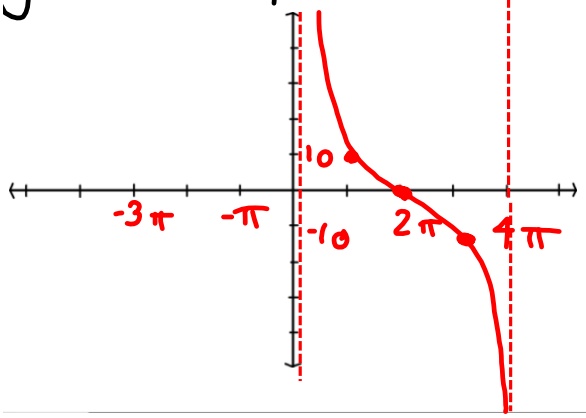


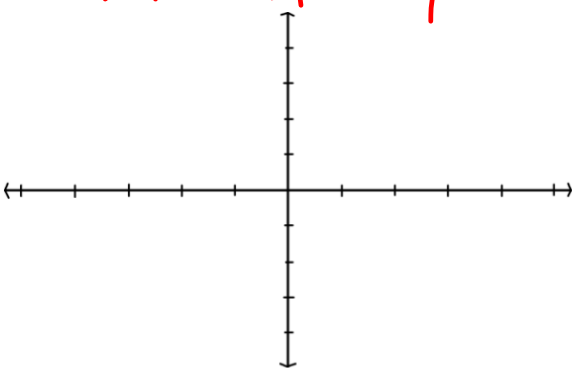
$y = \frac{1}{2}\tan 3x$ "amp": $1/2$ per: $\pi/3$

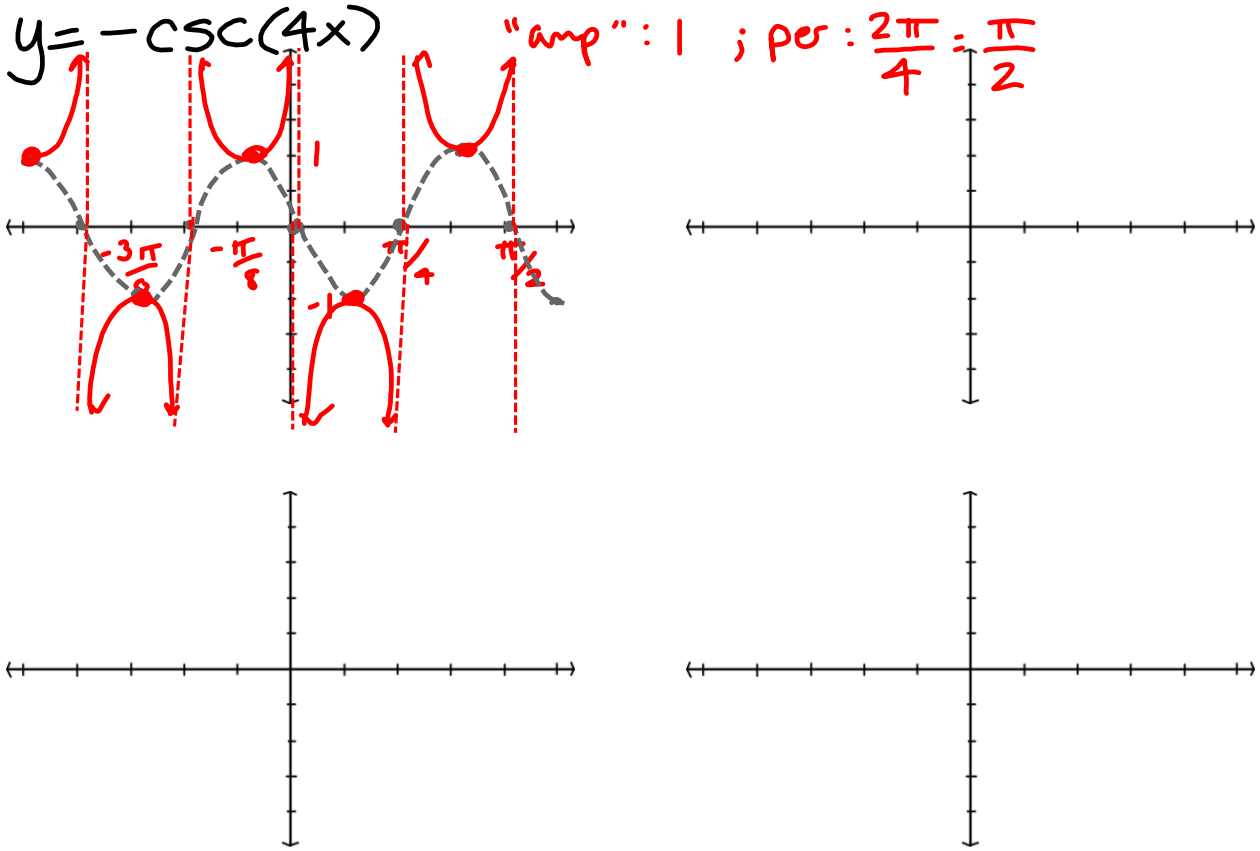




$y = 10\cot\frac{1}{4}x$ "amp" = 10, per: $\frac{\pi}{1/4} = \pi\cdot\frac{4}{1} = 4\pi$






y = −csc(4x)
"amp": 1 ; per: 2π/4 = π/2
1
-1
-3π/8
-π/8
π/4
π/2