

Part II: Horizontal Shifts ← Phase Shift

Just like in our previous functions, this will be in the parenthesis (with the x) and shift the function to the left or right.

The value in the parenthesis will change our two end points.

Ex 1) Graph $f(x) = \sin(x + \pi)$

Amp: 1

Per: 2π

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

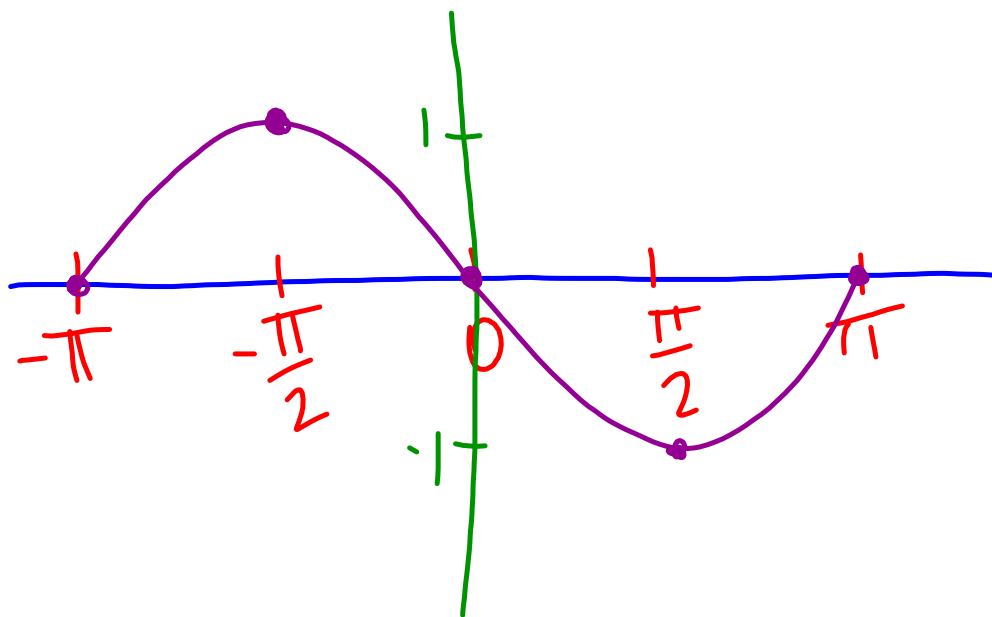
HS: $0 = x + \pi$
 $-\pi = x$

$-\pi = x$

★ Change starting point!
 Then start adding!

Need common denom
 HS AND Int

$$-\frac{\pi}{1 \cdot 2} = \frac{-2\pi}{2} + \frac{\pi}{2} = \frac{-\pi}{2} + \frac{\pi}{2} = 0 + \frac{\pi}{2} = \frac{\pi}{2} + \frac{\pi}{2} = \frac{2\pi}{2}$$



Ex 2) Graph $f(x) = \cos(2x - \frac{\pi}{2})$

Amp: 1
 Per: $\frac{2\pi}{2} = \pi$

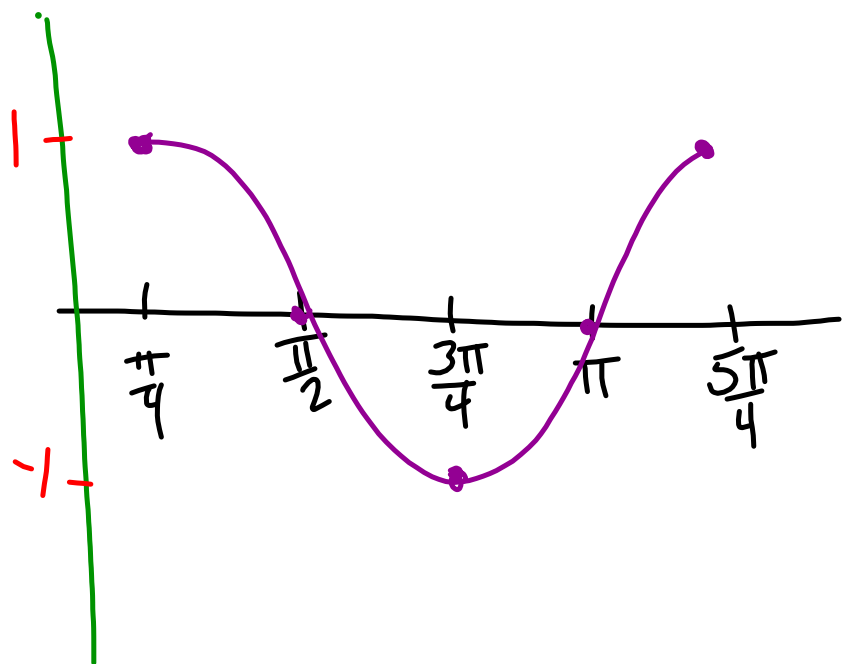
Int: $\frac{\pi}{4}$

HS: $0 = 2x - \frac{\pi}{2}$

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

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

HS: $x = \frac{\pi}{4}$



$\frac{\pi}{4} + \frac{\pi}{4} = \frac{2\pi}{4} + \frac{\pi}{4} = \frac{3\pi}{4} + \frac{\pi}{4} = \frac{4\pi}{4} + \frac{\pi}{4} = \frac{5\pi}{4}$

Int.

Ex 3) Graph $f(x) = \sin\left(3x - \frac{\pi}{6}\right)$

Int: $\frac{\pi}{6} \cdot 3 = \frac{3\pi}{18}$ HS: $\frac{\pi}{18}$

$$\frac{\pi}{18} + \frac{3\pi}{18} = \frac{4\pi}{18} + \frac{3\pi}{18} = \frac{7\pi}{18} = \frac{10\pi}{18} = \frac{13\pi}{18}$$

