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

$\frac{\pi}{6}$ to the left

$-\frac{\pi}{6}$ from x

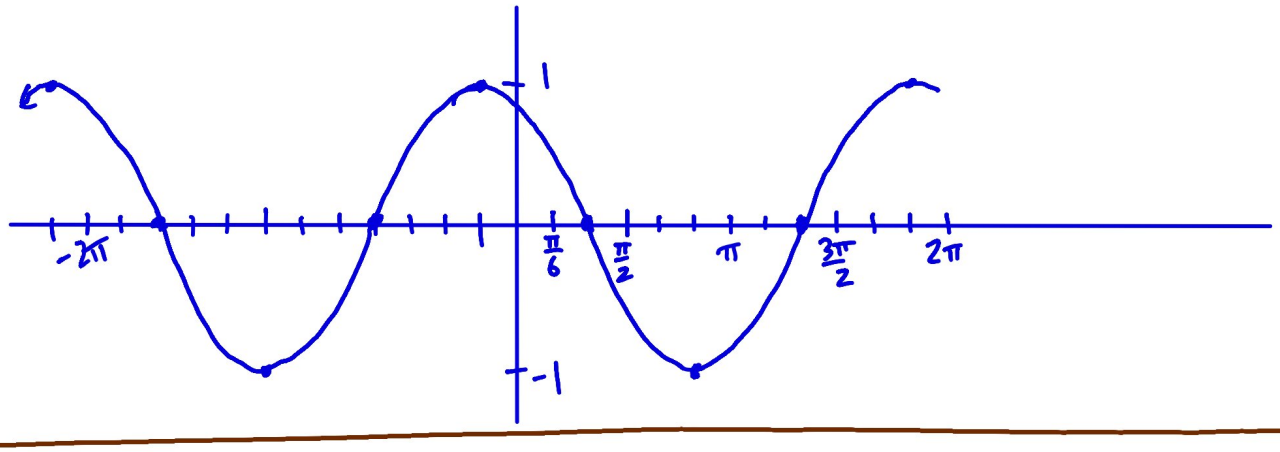
$(0,1) \longrightarrow \left(-\frac{\pi}{6}, 1\right)$

$\left(\frac{\pi}{2}, 0\right) \longrightarrow \left(\frac{\pi}{3}, 0\right)$ $\quad \frac{\pi}{2} - \frac{\pi}{6} = \frac{3\pi}{6} - \frac{\pi}{6} = \frac{2\pi}{6} = \frac{\pi}{3}$

$(\pi, -1) \longrightarrow \left(\frac{5\pi}{6}, -1\right)$ $\quad \pi - \frac{\pi}{6} = \frac{6\pi}{6} - \frac{\pi}{6} = \frac{5\pi}{6}$

$\left(\frac{3\pi}{2}, 0\right) \longrightarrow \left(\frac{4\pi}{3}, 0\right)$ $\quad \frac{3\pi}{2} - \frac{\pi}{6} = \frac{9\pi}{6} - \frac{\pi}{6} = \frac{8\pi}{6} = \frac{4\pi}{3}$

$(2\pi, 1) \longrightarrow \left(\frac{11\pi}{6}, 1\right)$ $\quad 2\pi - \frac{\pi}{6} = \frac{12\pi}{6} - \frac{\pi}{6} = \frac{11\pi}{6}$



Section 5.6 Sinusoidal Curves

Graph using period, phase shift, and amplitude.

phase shift = horizontal shift

$y = a\sin(\omega x - \phi)$ or $y = a\cos(\omega x - \phi)$

ω: greek letter "omega"

ϕ: greek letter "phi"

Amplitude $= |a|$

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

Phase Shift $= \frac{\phi}{\omega}$

ex: $y = 3\sin\left(\frac{\pi}{4}x\right)$ $\quad a = 3$, $\omega = \frac{\pi}{4}$, $\phi = 0$

$y = 3\sin\left(\frac{\pi}{4}x - 0\right)$

$\text{Amp} = |3| = 3$

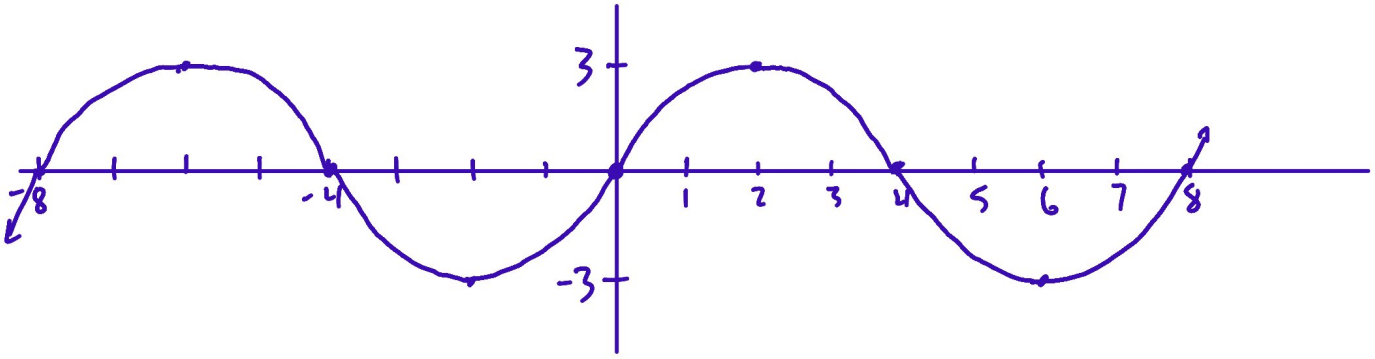
$\text{Period} = \frac{2\pi}{\frac{\pi}{4}} = 2\pi \cdot \frac{4}{\pi} = 8$

$\text{P.S.} = \frac{0}{\frac{\pi}{4}} = 0$

For sine y's: 0, a, 0, −a, 0

$(0, 0)\ (2, 3)\ (4, 0)\ (6, -3)\ (8, 0)$

P.S. | avg of 1st and 3rd x's | avg of outer 2 x's | avg of 3rd and 5th x's | P.S. + period



ex: $y = -2\cos(4x - \pi)$

$a = -2$, $\omega = 4$, $\phi = \pi$

$\text{Amp} = |-2| = 2$

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

$\text{P.S.} = \frac{\pi}{4}$

For cosine: a, 0, −a, 0, a

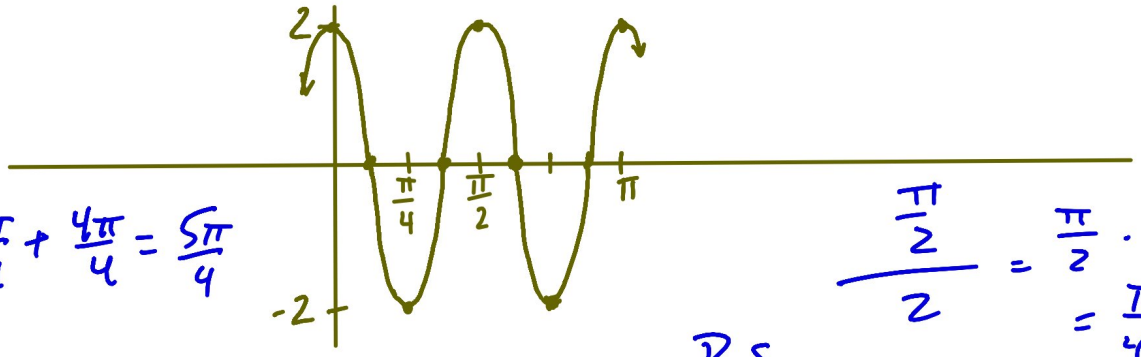
$\left(\frac{\pi}{4}, -2\right)\left(\frac{3\pi}{8}, 0\right)\left(\frac{\pi}{2}, 2\right)\left(\frac{5\pi}{8}, 0\right)\left(\frac{3\pi}{4}, -2\right)$

$\frac{3\pi}{8}$: on calc $\left(\frac{1}{4} + \frac{1}{2}\right) \cdot \frac{1}{2} = \frac{3}{8}$

$\frac{\pi}{2}$: $\frac{1}{2}\left(\frac{\pi}{4} + \frac{3\pi}{4}\right) = \frac{1}{2}\left(\frac{4\pi}{4}\right) = \frac{\pi}{2}$

$\frac{5\pi}{8}$: $\left(\frac{1}{2} + \frac{3}{4}\right) \cdot \frac{1}{2} = \frac{5}{8}$

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



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

$\frac{\frac{\pi}{2}}{2} = \frac{\pi}{2} \cdot \frac{1}{2} = \frac{\pi}{4}$

P.S.

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

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

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