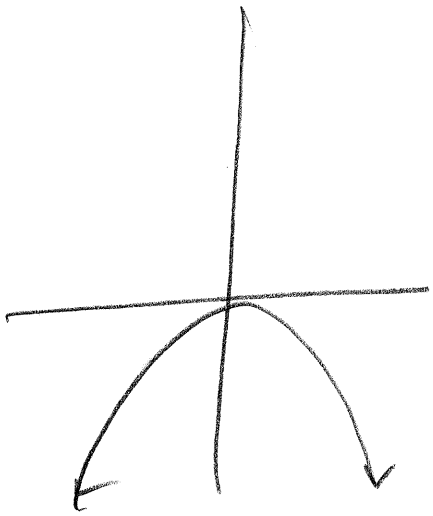
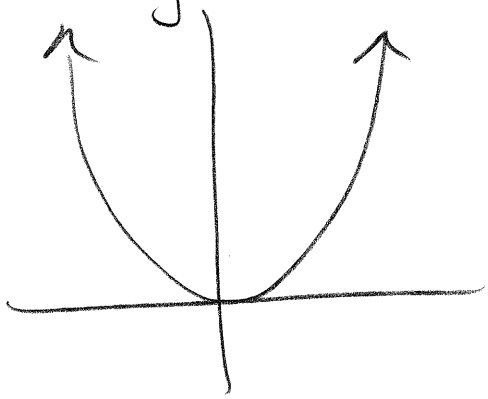
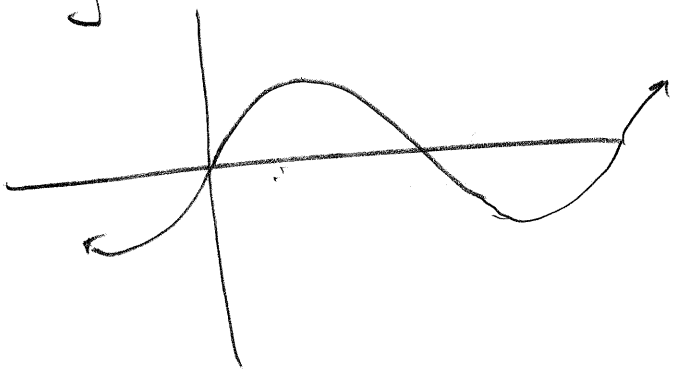
$y = -x^2$



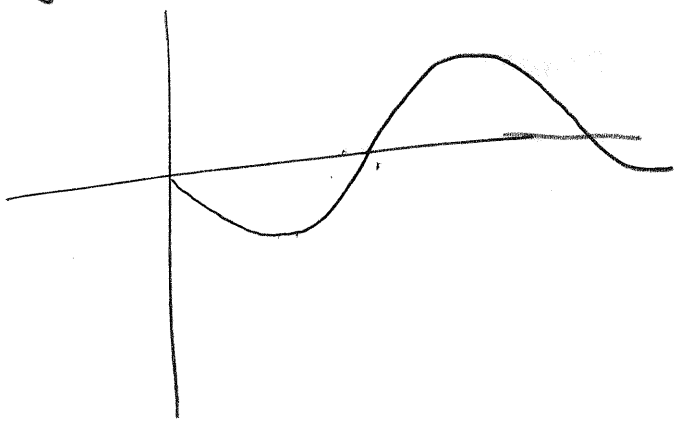
$y = x^2$



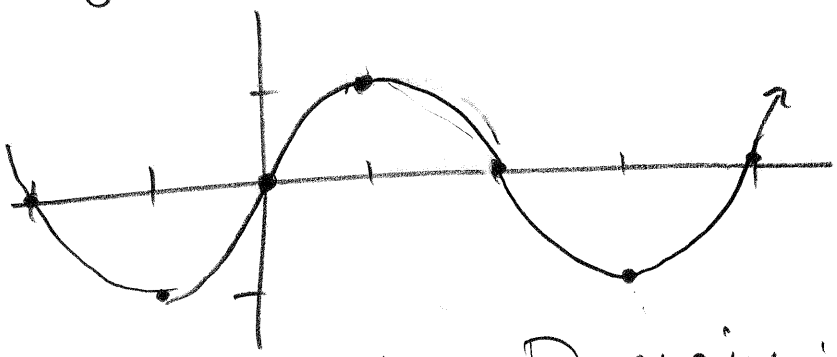
$y = \sin x$



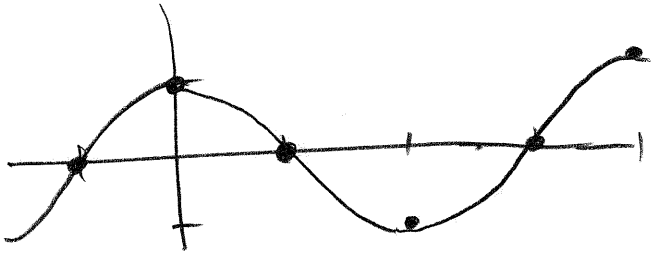
$y = -\sin x$



$y = \sin x$



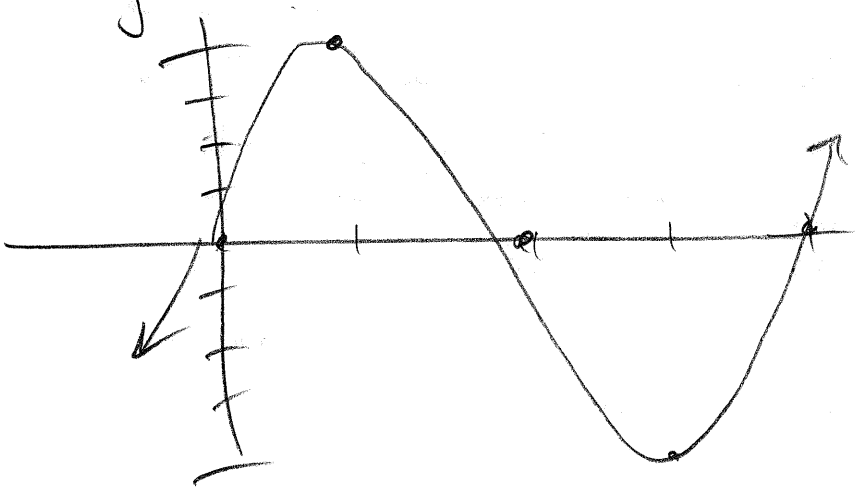
$y = \cos x$



$x \rightarrow$ Domain: $(-\infty, \infty)$

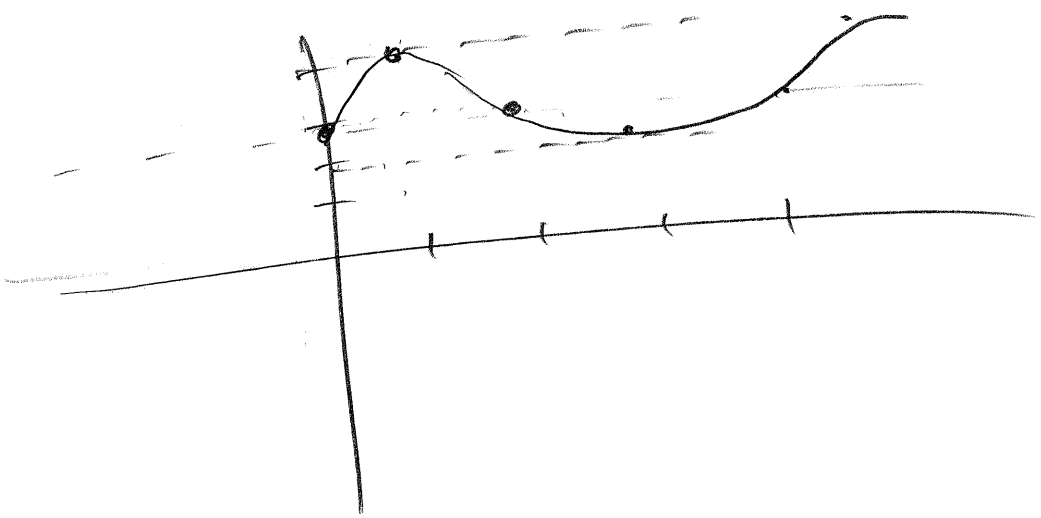
$y \rightarrow$ Range: $[-1, 1]$

$y = 4\sin x$



Range: $[-4, 4]$

$y = \sin x + 3$



Domain: $(-\infty, \infty)$

Range: $[2, 4]$

$y = A\sin(x - C) + D$ $y = A\cos(x - C) + D$

Domain: $(-\infty, \infty)$

Range: $[-A + D, A + D]$

$y = -\sin x + 3$

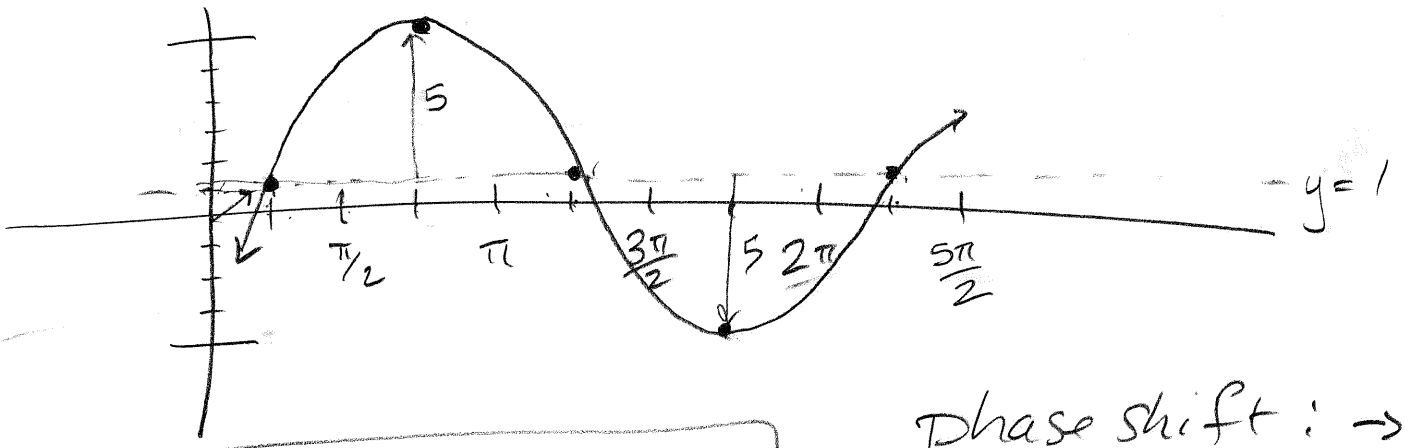
Range: $[2, 4]$

What if my Key points are

$\left(\frac{\pi}{4}, 1\right)$, $\left(\frac{3\pi}{4}, 6\right)$, $\left(\frac{5\pi}{4}, 1\right)$, $\left(\frac{7\pi}{4}, -4\right)$

and $\left(\frac{9\pi}{4}, 1\right)$

What is the sine equation with the smallest phase shift



phase shift: $\rightarrow \frac{\pi}{4}$

$\frac{\pi}{4}$

$$y = 5\sin\left(x - \frac{\pi}{4}\right) + 1$$

Sec 2.2 The General Sine Wave

General Equation:

$$y = A\sin[B(x-C)] + D$$

$$y = A\cos[B(x-C)] + D$$

I Know

$|A|$ = Amplitude

C = Phase Shift

D = Vertical Shift

What does B tell us

$y = \sin x$ $\quad$ $y = \sin 2x$

2 entire cycles for $y = \sin 2x$

3 entire cycles for $y = \sin 3x$

$y = \sin x$

Period $= 2\pi$

$y = \sin 2x$

$\frac{2\,\text{period}}{2} = \frac{2\pi}{2}$

$\text{period} = \pi$

$y = \sin 3x$

$3\,\text{period} = 2\pi$

$\text{period} = \frac{2\pi}{3}$

$y = \sin Bx$

B periods $= 2\pi$ $\rightarrow$ $\text{period} = \frac{2\pi}{B}$

$y = \sin\left(\frac{x}{2}\right)$ $\quad B = \frac{1}{2}$

$\text{Period} = \frac{2\pi}{B} = \frac{2\pi}{1/2} \cdot \frac{2}{2} = 2\pi \cdot 2 = 4\pi$

$y = \cos\left(\frac{\pi}{2}x\right)$; $B = \frac{\pi}{2}$

$\text{period} = \frac{2\pi}{\pi/2} = 2\pi \cdot \frac{2}{\pi} = 4$

$y = A\sin[B(x-C)] + D$ and $y = A\cos[B(x-C)] + D$

important info

$\text{Amp} = |A|$

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

Phase Shift = C

Vertical shift = D

$y = -3\cos\left(\underset{\div 2}{2x} - \frac{\pi}{4}\right) - 2$ $\quad B$ ↙ $\quad$ ↖ $[2(x - \pi/8)$

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

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

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

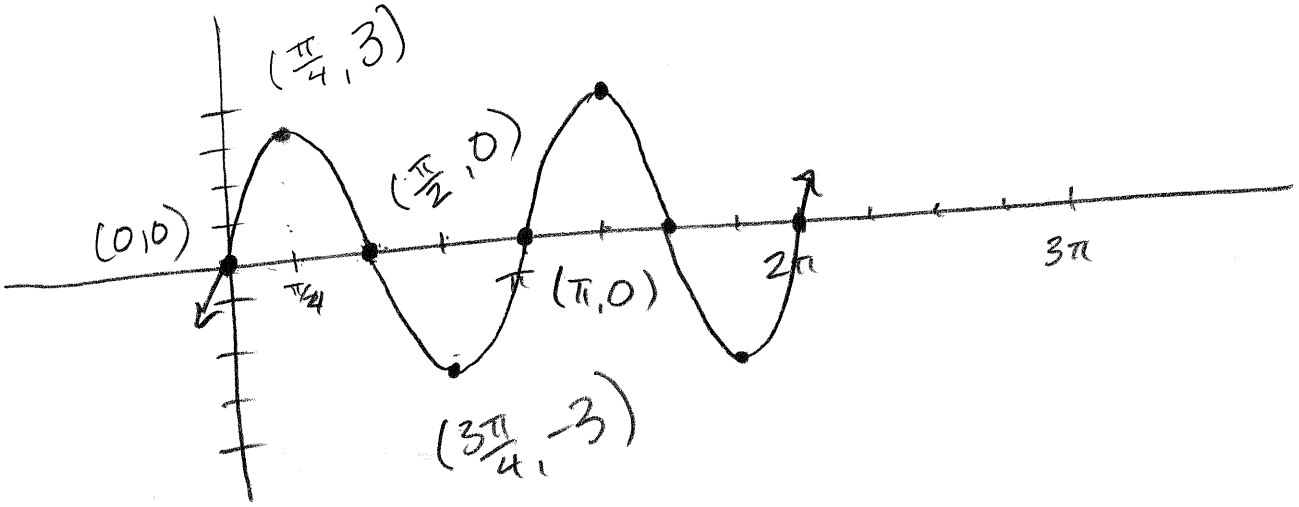
Phase shift = $\frac{\pi}{8}$

Vert Shift = -2

$y = 3\sin(2x)$ for 2 full periods

Amp = 3

Period = π ← divide axis into $\frac{\pi}{4}$



Period = 2π

$\frac{1}{4}$ of the period: $\frac{2\pi}{4} = \frac{\pi}{2}$

If X-axis Represent time

The period of a sine wave is an amount of time it takes to complete one full cycle

Frequency: the # of cycles in 1 unit of time

$$\text{Frequency} = \frac{1}{\text{Period}}$$

Find the frequency of $y = \cos(100\pi x)$

1st find period. Period: $\frac{2\pi}{100\pi} = \frac{1}{50}$

2nd frequency = $\frac{1}{\text{period}} = \frac{1}{1/50} = \frac{50}{1} = 50$