§6-5

Find amplitude (if applicable) & period.

(1) $y = 3\sin x$

amplitude $= A = 3$
period $= P = 2\pi$

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

$A = \frac{1}{2}$
$P = 2\pi$

(5) $y = \sin 3x$

$A = 1$
$P = \frac{2\pi}{3}$

(7) $y = \cot 4x$

Recall that the period of cot is π.
So the period of y is
$P = \frac{\pi}{4}$

(11) $y = \csc\left(\frac{x}{2}\right)$

$P = \frac{2\pi}{\left(\frac{1}{2}\right)} = 4\pi$

Find amplitude, period, & zeros

(13) $y = \sin \pi x$, $-2 \le x \le 2$

$A = 1$
$P = \frac{2\pi}{\pi} = 2.$

The zeros of $\sin(x)$ occur at $x = n\pi$, where n is an integer.
So we can find the zeros of y by setting the input of the sin function equal to $n\pi$ and solving for x.

(13 cont.)

We set $\pi x = n\pi$
So $\boxed{x = n}$

So the zeros are at integers:
$-2, -1, 0, 1, 2.$

(16) $y = \frac{1}{2}\tan\left(\frac{x}{2}\right)$, $-\pi < x < 3\pi$

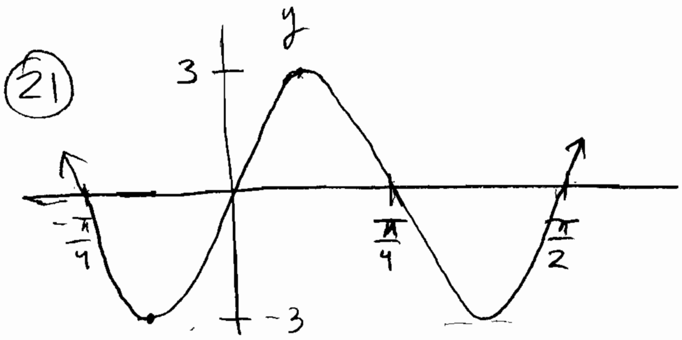
The tan has no amplitude, although we can still notice that the vertical axis is compressed by a factor of $\left(\frac{1}{2}\right)$.
The period of tan is π,
so the period of y is
$P = \frac{\pi}{\left(\frac{1}{2}\right)} = 2\pi.$

The zeros of $\tan x$ occur when $x = n\pi$, where n is an integer.
So we can find the zeros of y by setting:

$\frac{x}{2} = n\pi$
$x = n(2\pi).$

i.e. $x = \ldots, 0, 2\pi, 4\pi, \ldots$
$x = 2\pi$ is the only zero in $(-\pi, 3\pi)$.

(21)



Period $= P = \frac{\pi}{2} = \frac{2\pi}{|B|}$

So $|B| = \frac{2\pi}{\left(\frac{\pi}{2}\right)} = 4$

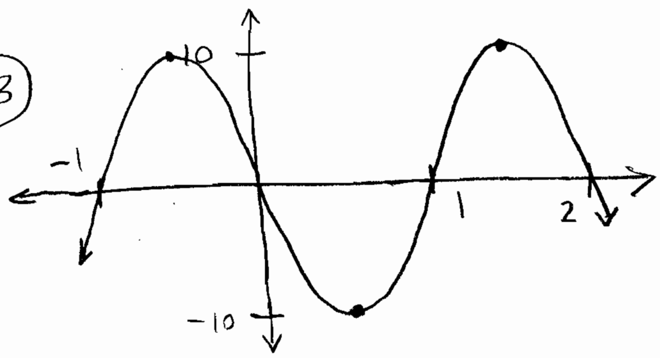
The graph is not flipped up-side-down,

So $B =$ (positive) 4

Amplitude $= A = 3$

So $\boxed{y = 3\sin(4x)}$

(23)



$A = 10$

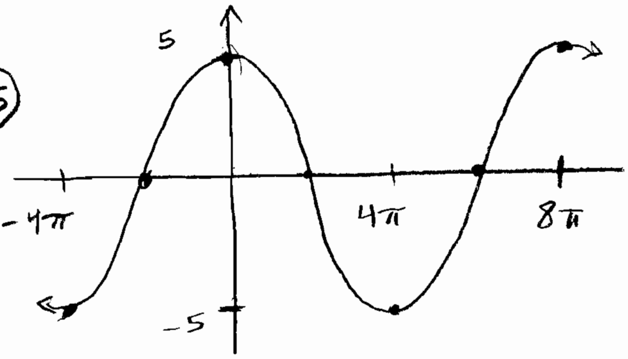
$P = 2 = \frac{2\pi}{|B|}$

$|B| = \pi$

$B = -\pi$, since flipped.

So $\boxed{y = -10\sin \pi x}$

(25)



$A = 5$

$P = 8\pi = \frac{2\pi}{B}$

$B = \frac{1}{4}$

$\boxed{y = 5\cos\left(\frac{1}{4}x\right)}$

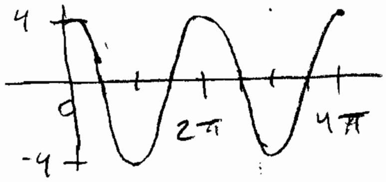
Find amplitude, period, & phase shift. Graph.

(29) $y = 4\cos x, \quad 0 \le x \le 4\pi$

$A = 4$

$P = 2\pi$

shift $= 0$



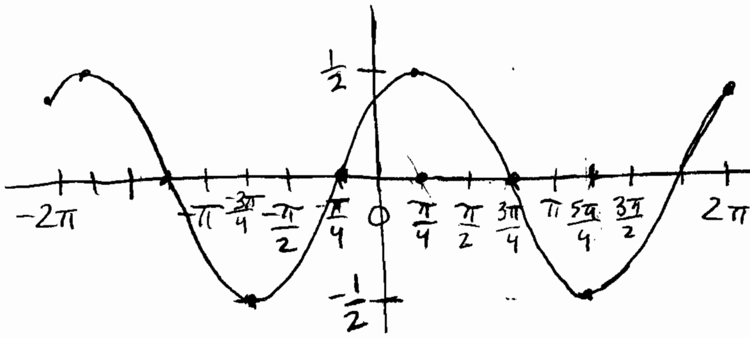
(31) $y = \frac{1}{2}\sin\left(x + \frac{\pi}{4}\right), \; -2\pi \le x \le 2\pi$

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

$P = 2\pi$, so a quarter cycle is $\frac{\pi}{2}$

shift $= -\frac{\pi}{4}$ = beginning of cycle.

The "key points" are quarter-cycle points, so adding multiples of $\frac{\pi}{2}$ to $\left(-\frac{\pi}{4}\right)$ gives the key points:

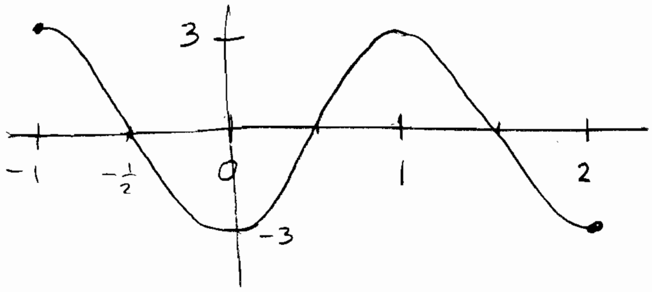


(39) $y = -3\sin\left[2\pi\left(x+\frac{1}{2}\right)\right], -1 \le x \le 2$

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

horizontal shift $= -\frac{1}{2}$

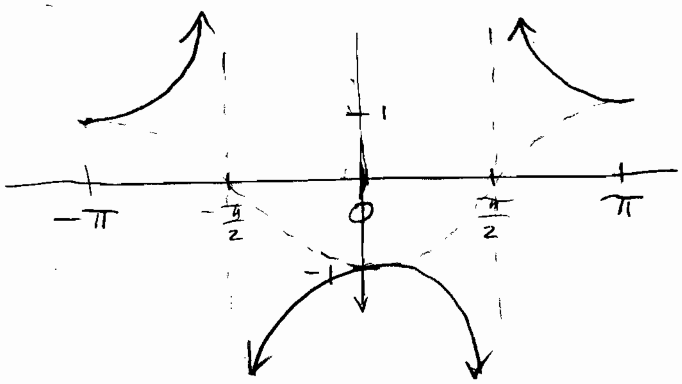
amplitude $= 3$, flipped vertically.



(41) $y = \sec(x+\pi), -\pi \le x \le \pi$

horizontal shift $= -\pi$, period $= 2\pi$

Helps to graph $\cos(x+\pi)$.



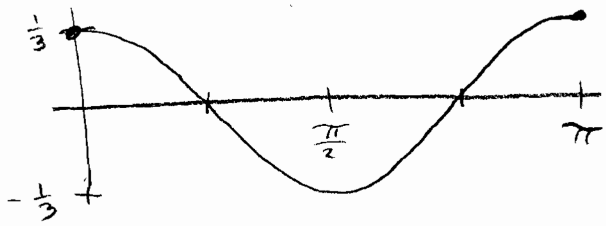
(45) T

(49) T

(89) $x = \frac{1}{3}\cos 8t, \quad 0 \le t \le \pi$

period $= \frac{2\pi}{8} = \frac{\pi}{4}$

amplitude $= \frac{1}{3}$



(95) $I = 15\cos\left(120\pi t + \frac{\pi}{2}\right),$

$0 \le t \le \frac{2}{60}$

$A = 15$

$P = \frac{2\pi}{120\pi} = \frac{1}{60}$

shift $= \frac{-\frac{\pi}{2}}{120\pi} = \frac{-1}{240}$