57

$5\pi/9$

πh

16

$(16\cos\frac{5\pi}{9},\ 16\sin\frac{5\pi}{9})$

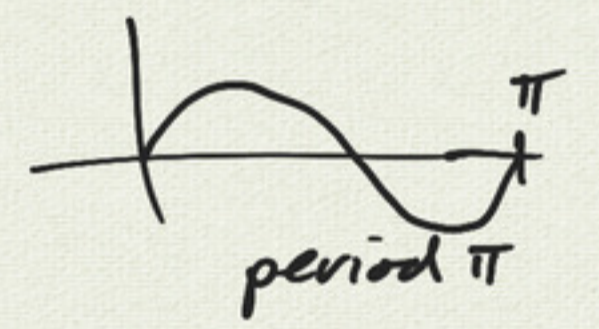$(\cos\frac{5\pi}{9},\ \sin\frac{5\pi}{9})$

$5\pi/9$

6.1

⑬ $\quad f(x) = 4\cos\pi x$

vertical
scale
×4

(amplitude 4)

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

$\sin 2x$

π

period π

$y = \sin bx \implies$ period $\frac{2\pi}{b}$

$y = 4$

$y = 0$

½   1   3/2

$y = -4$

$x = 2$
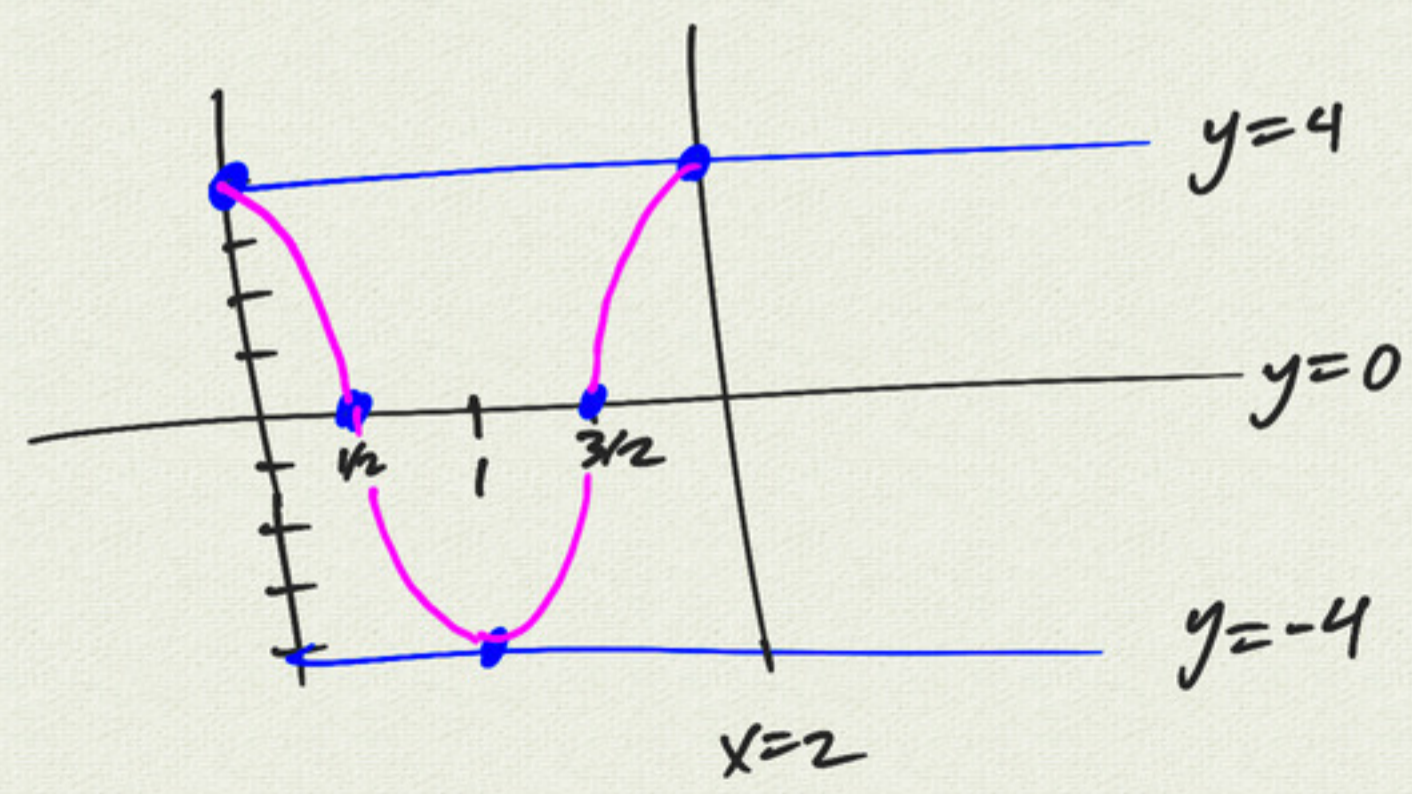
$$f(x) = a \sin[b(x-h)] + k$$

general sinvsoid

— sin or cos

↗ vertical scale
amplitude

↑ horizontal scale $\frac{1}{b}$

period $\frac{2\pi}{b}$

↑ translation/shift
"center" (h,k)

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example:

$$f(x) = -3\cos\left[2\left(x-\frac{\pi}{2}\right)\right] + 1$$

← vertical shift
up 1

↖ $(x-h)$ — horizontal shift
$\pi/2$ right

↗ −3 vertical
scale
―――
amplitude 3
flipped

↑ period $\frac{2\pi}{b} = \frac{2\pi}{2} = \pi$

$y=4$

$y=1$

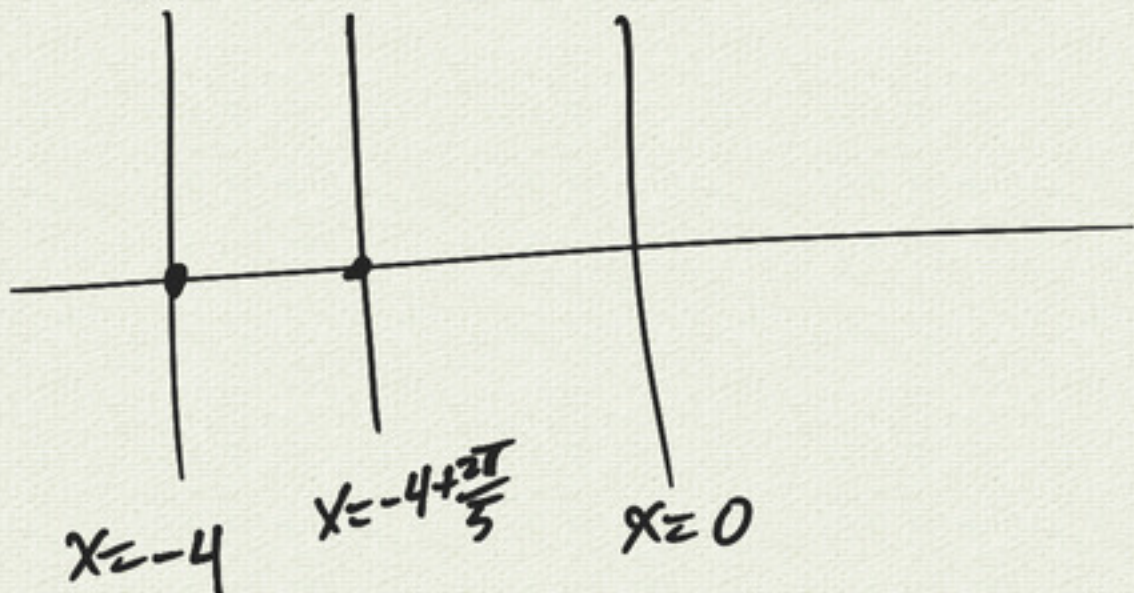$y=-2$

4
3
2
1
-1
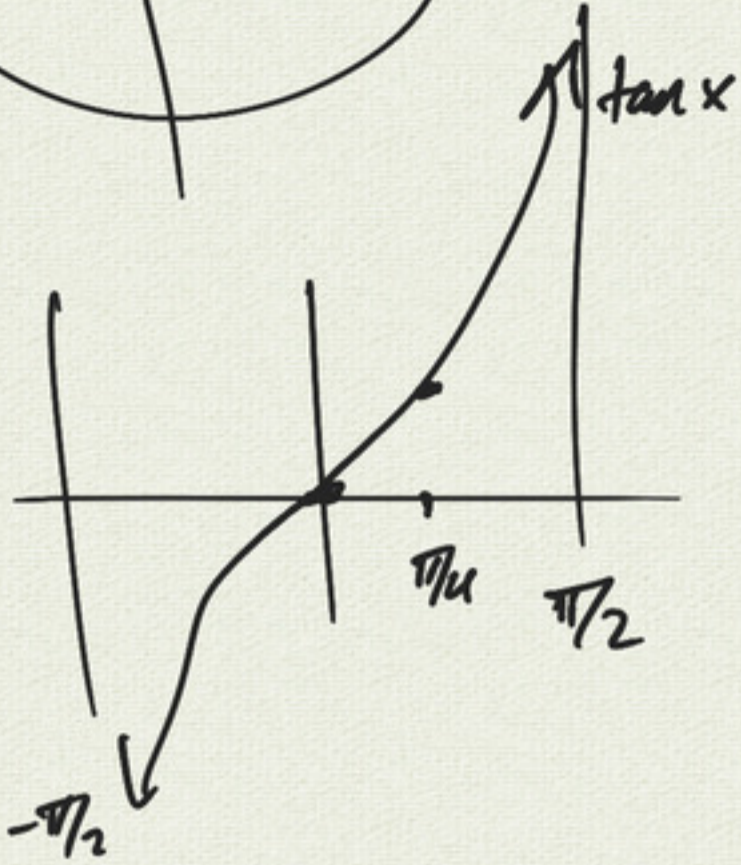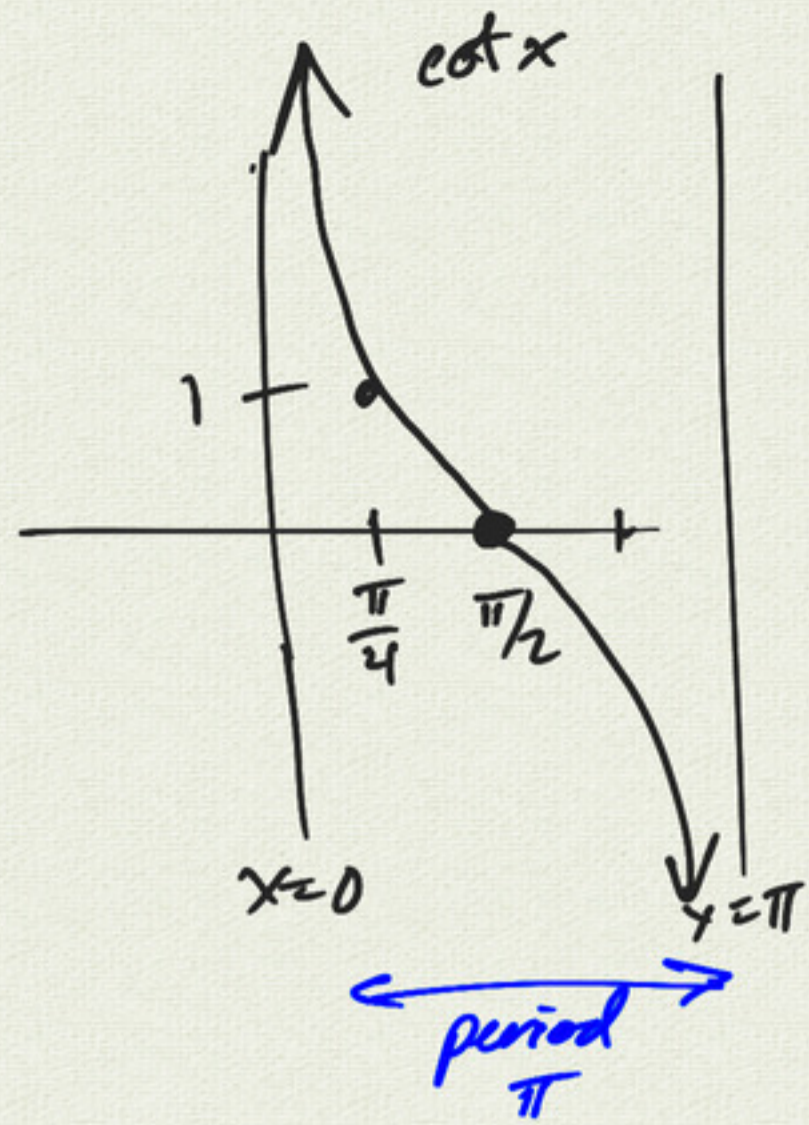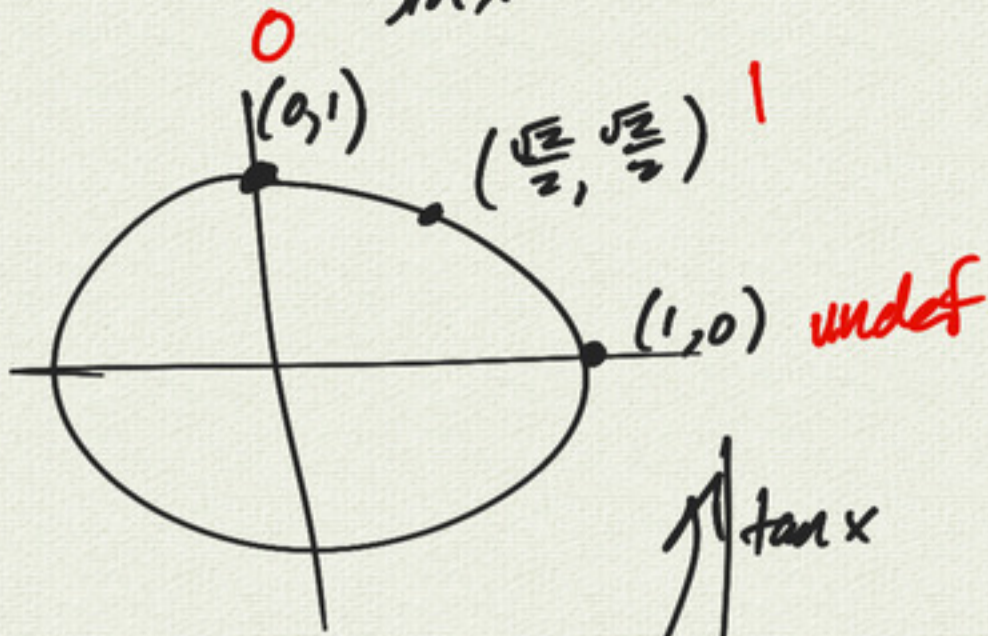-2

$x=\pi/2$ $x=\pi$ $x=3\pi/2$
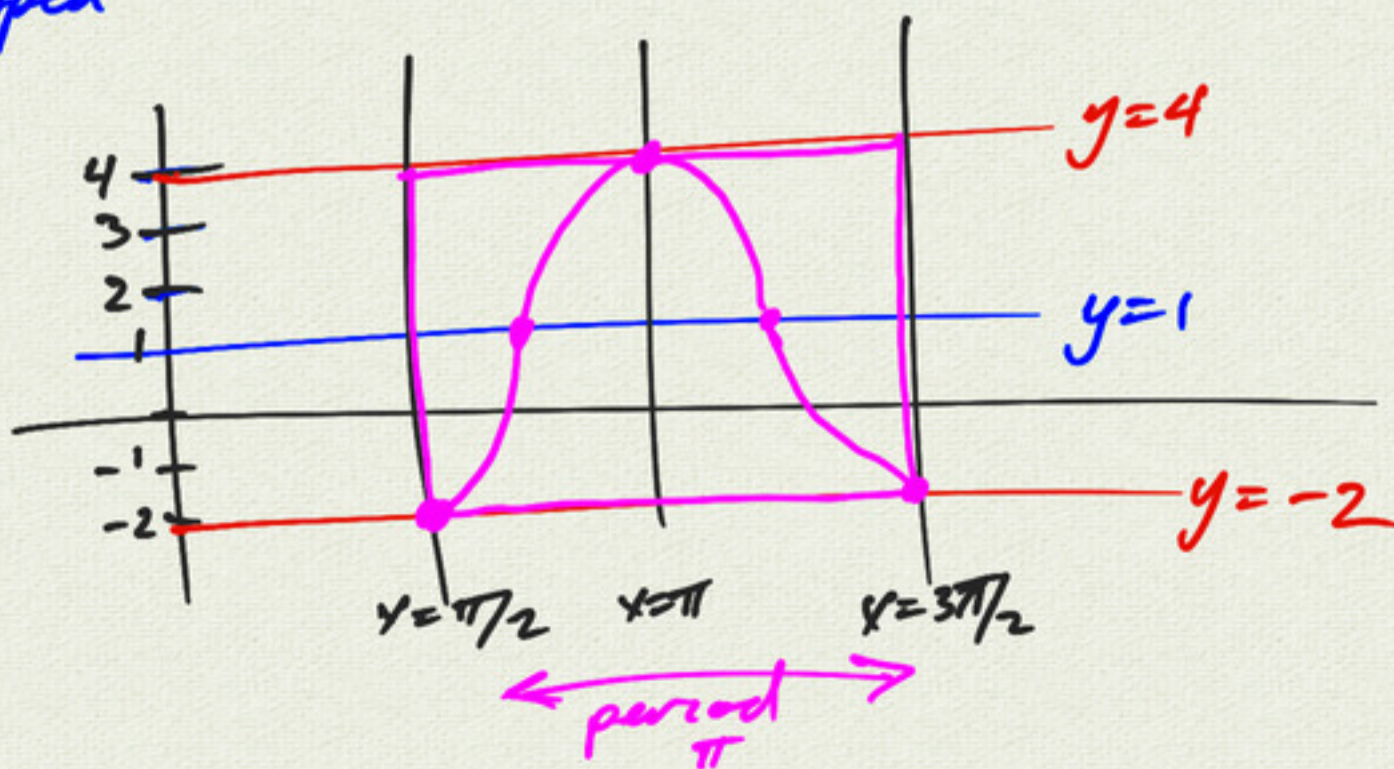
← period →
π

(17)

$$y = 5\sin(5x + 20) - 2$$
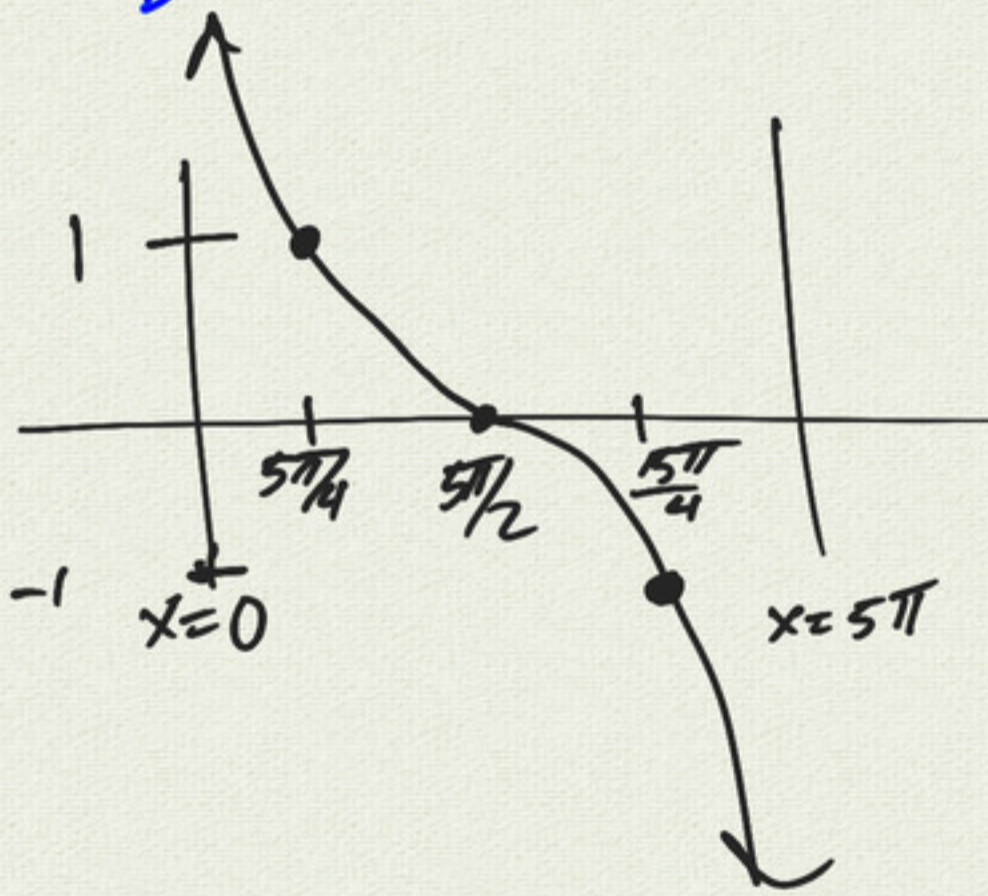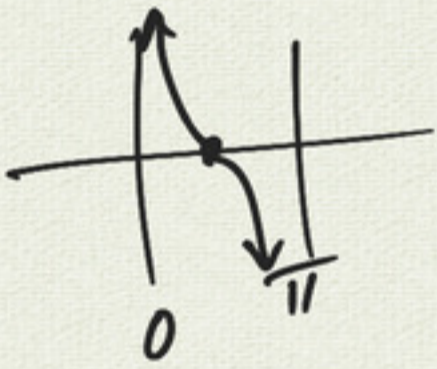$$= 5\sin[5(x + 4)] - 2$$

period $\frac{2\pi}{5}$

← horizontal shift
−4

$x = -4$ $x = -4 + \frac{2\pi}{5}$ $x = 0$

$$\cot x = \frac{\cos x}{\sin x}$$

0

$(0,1)$

$\left(\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2}\right)$ 1

$(1,0)$ undef

$\tan x$

$\pi/4$ $\pi/2$

$-\pi/2$

cot x

1

$\frac{\pi}{4}$ $\pi/2$

$x=0$ $y=\pi$

period
π

$y = \cot \dfrac{x}{5}$ ⟸ period $\dfrac{\pi}{b} = \dfrac{\pi}{(1/5)} = 5\pi$

0   π

1

$\frac{5\pi}{4}$ $5\pi/2$ $\frac{5\pi}{4}$

-1 $x=0$ $x=5\pi$

$y = \tan \dfrac{x}{5}$ ⟸ period 5π

tan

$-\pi/2$ $\pi/2$

$-\frac{5\pi}{4}$

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

-1

$-\frac{5\pi}{2}$ $x=0$ $5\pi/2$

period
5π