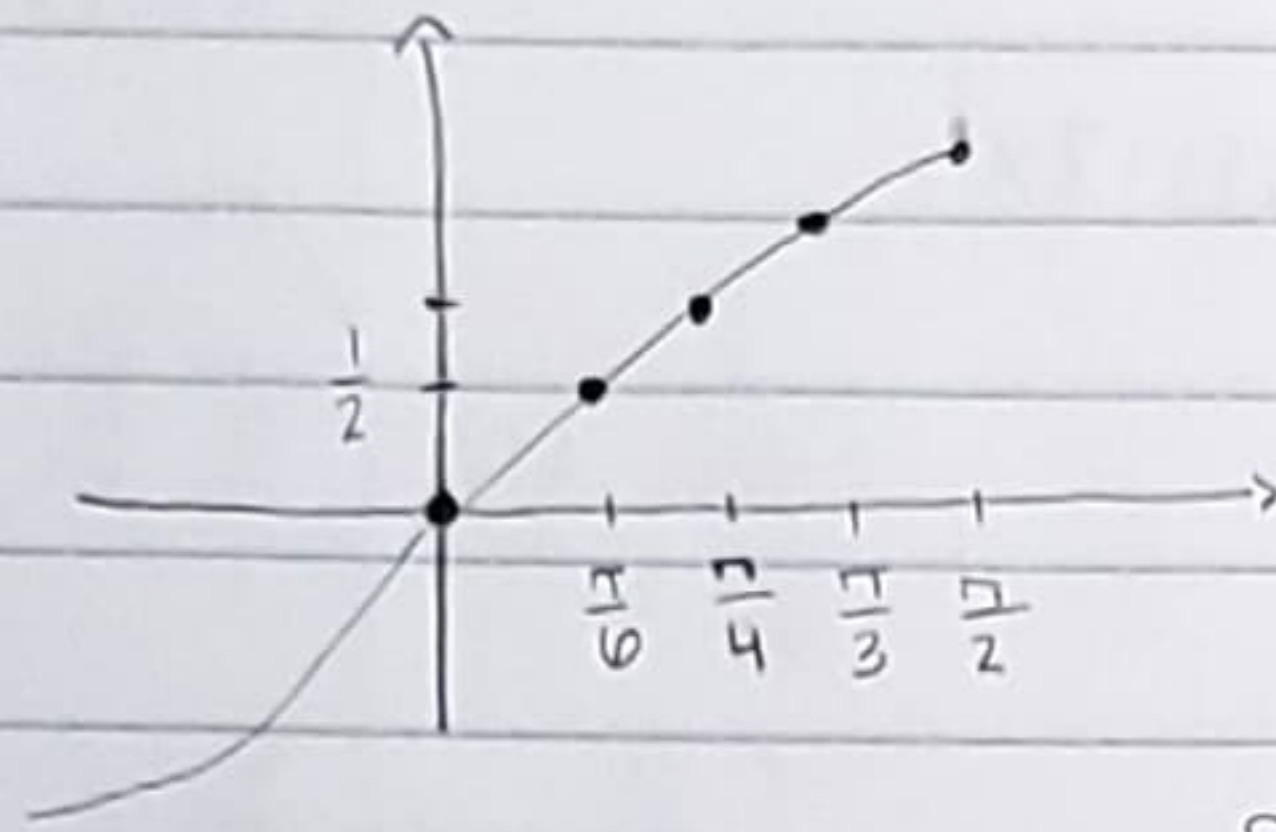


Graph of trigometric func

11 may 2023

odd func

$\sin(x) =$

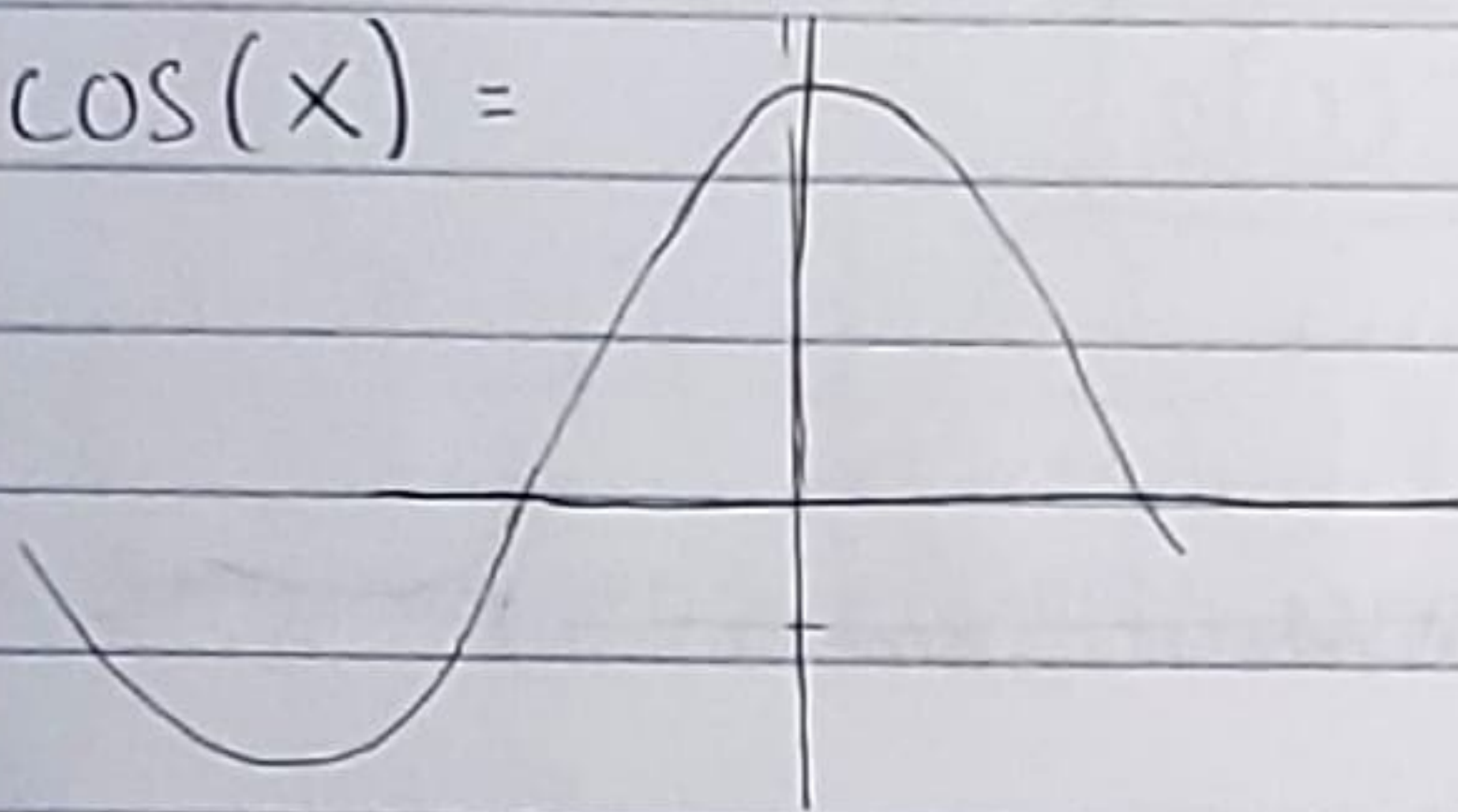


$\sin x = \sin(x + 2\pi)$

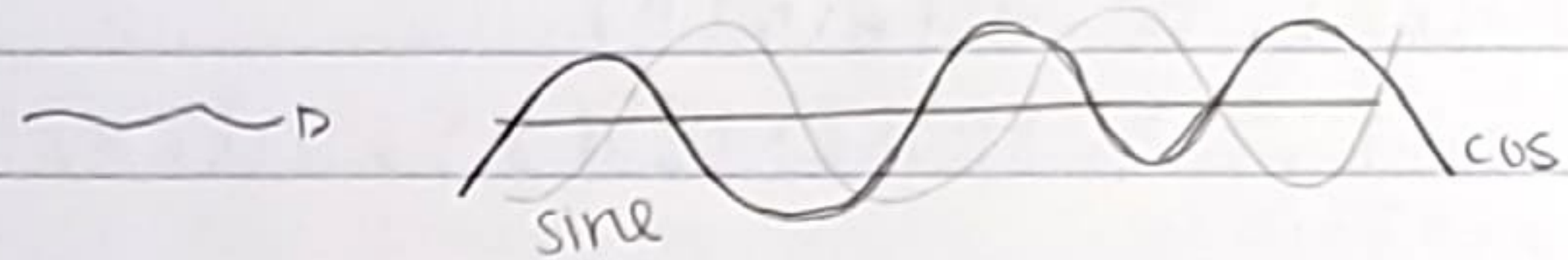
$\sin x$ is a periodic func w/ period = 2π

even func

$\cos(x) =$



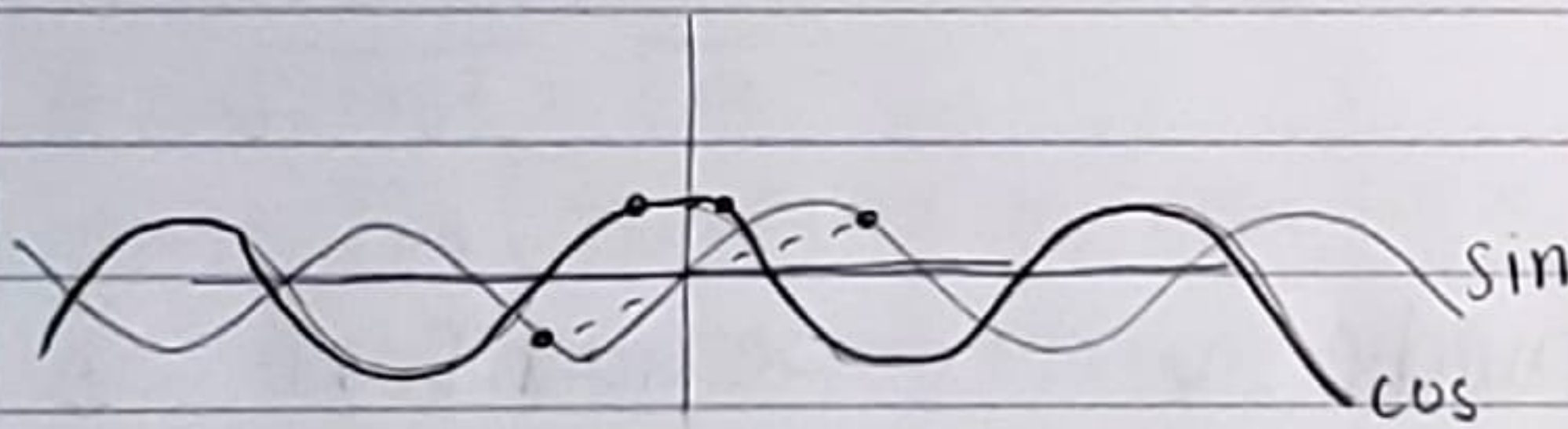
Shift the peak from \sin by $\pi/2$



$\cos(x) = \sin(x + \frac{\pi}{2})$

$\cos x$ is periodic w/ period = 2π

- Odd and even on graph:

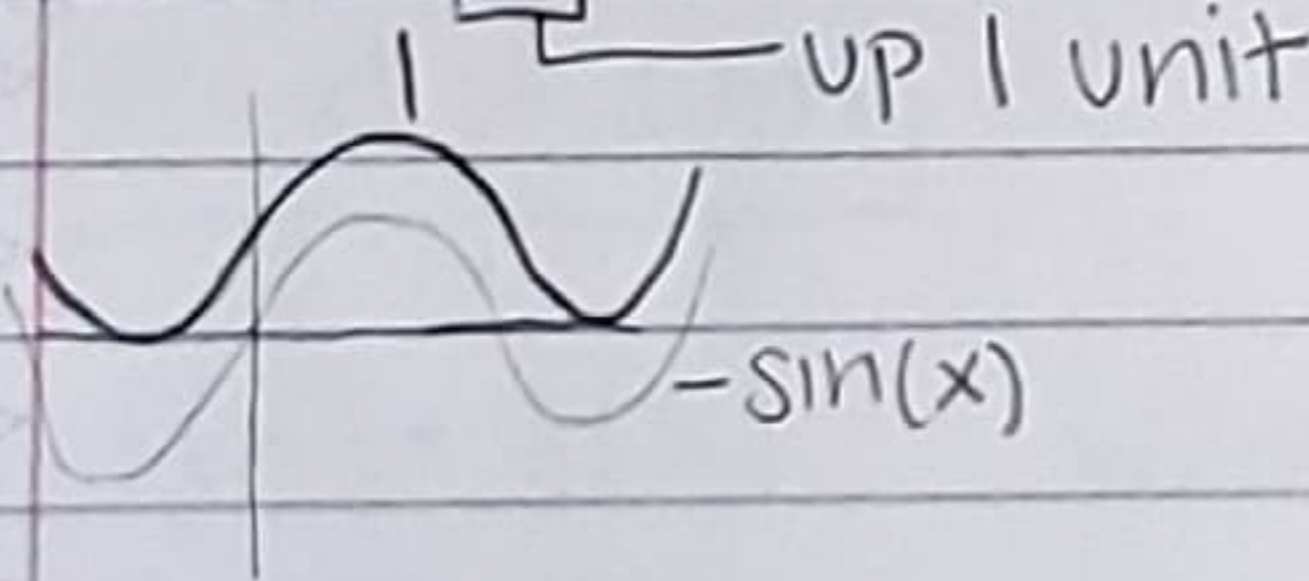


\sin = odd bc symmetric at origin
 \cos = even bc symmetric at y-axis

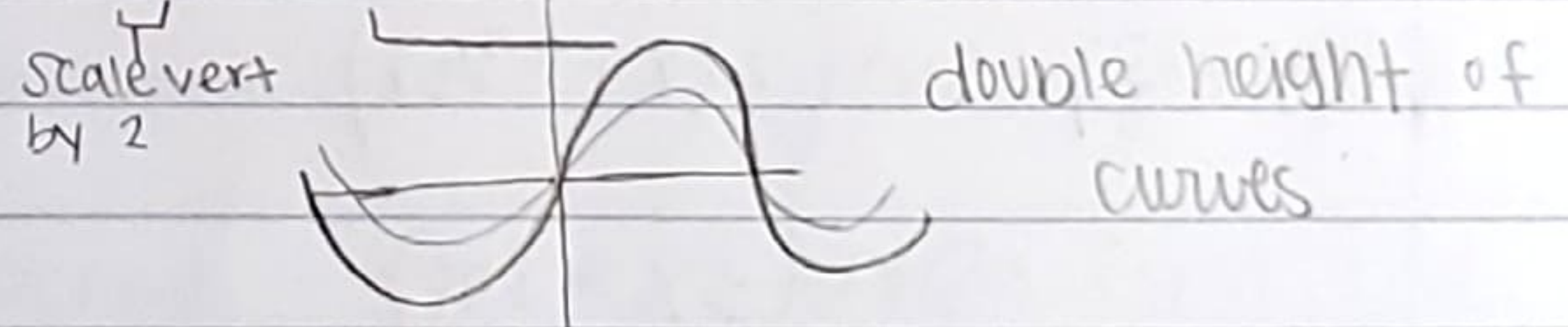
Graph manipulation

12 may 2023

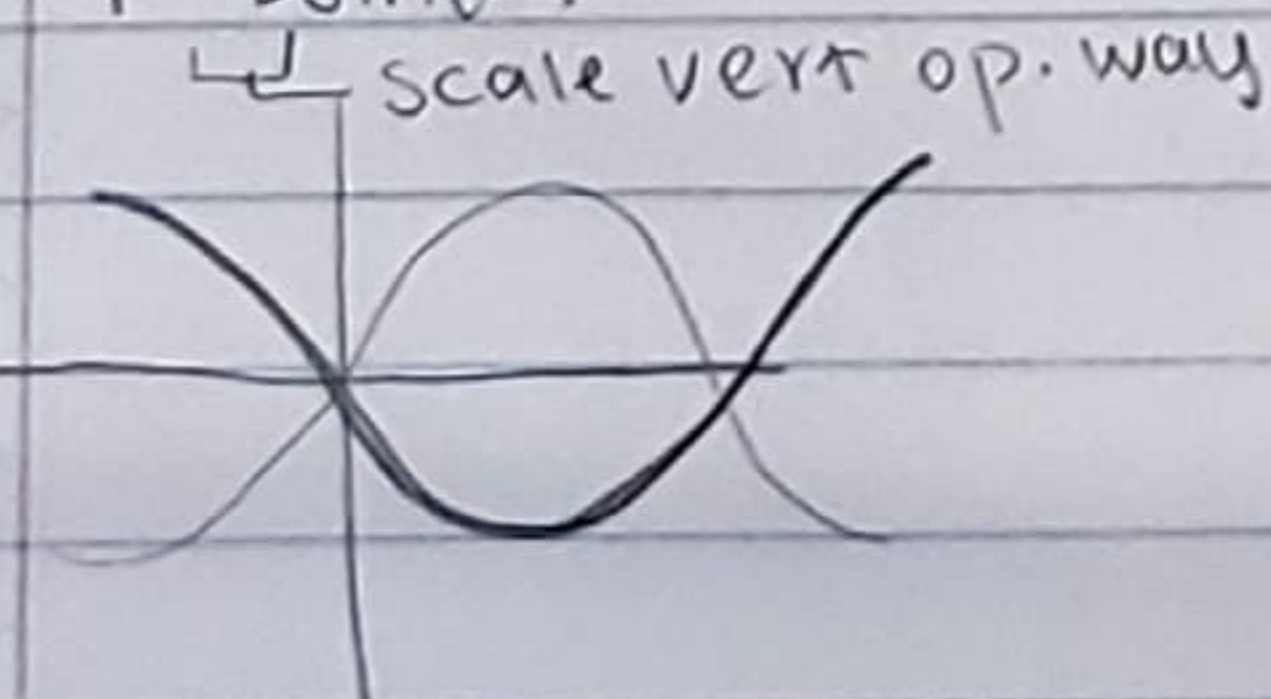
$y = \sin(x) + 1$



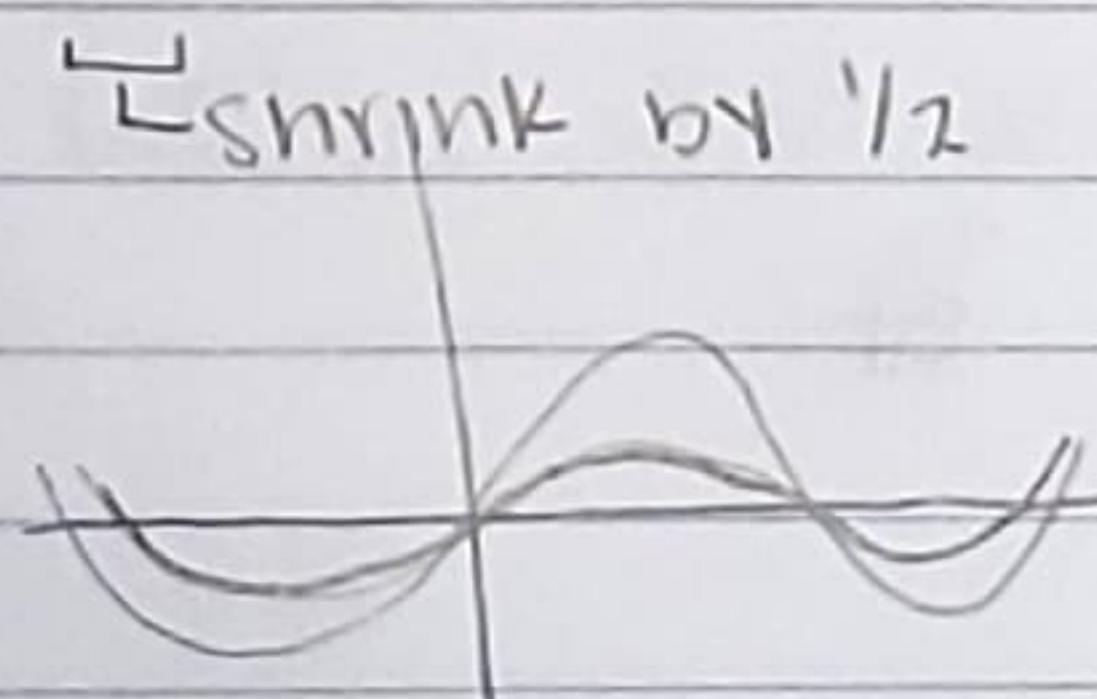
$y = 2\sin(x)$

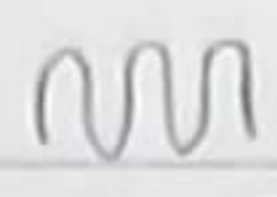



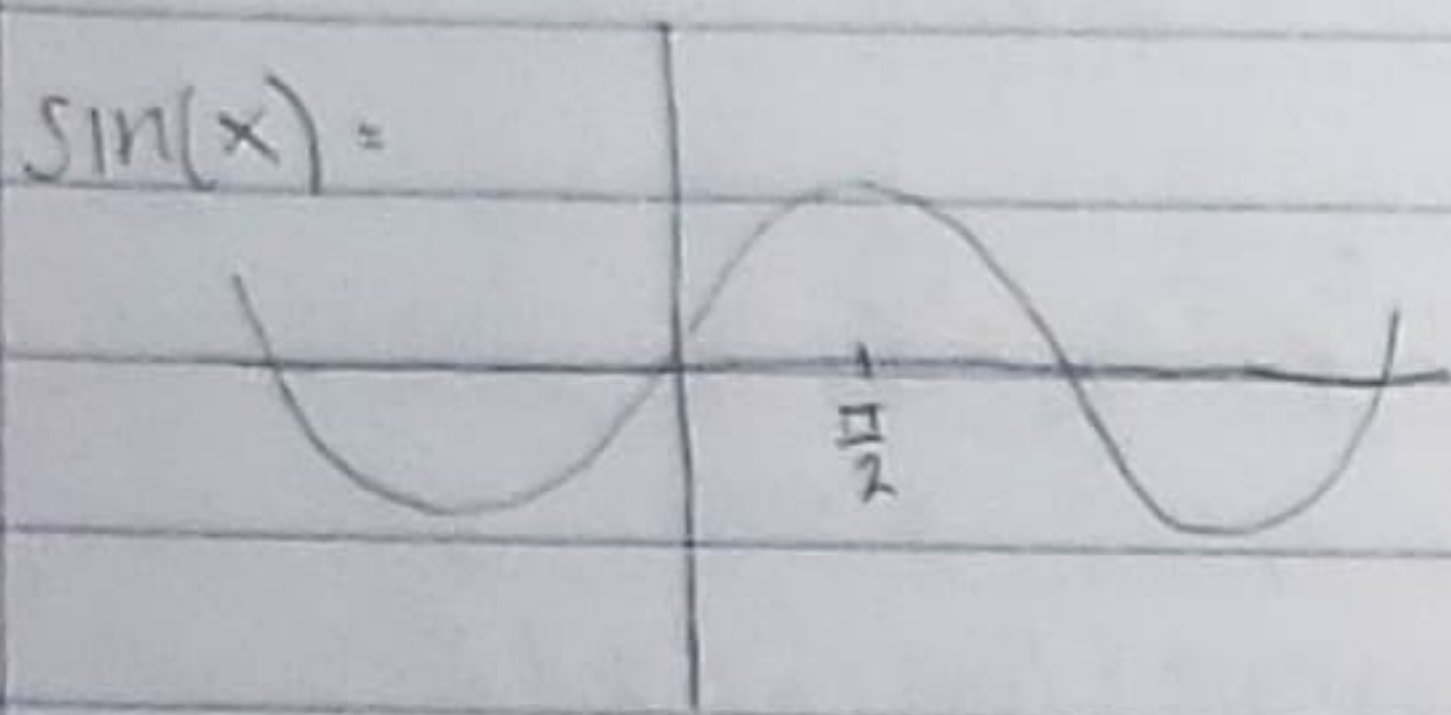
$y = -2\sin(x)$



$y = \frac{1}{2}\sin(x)$

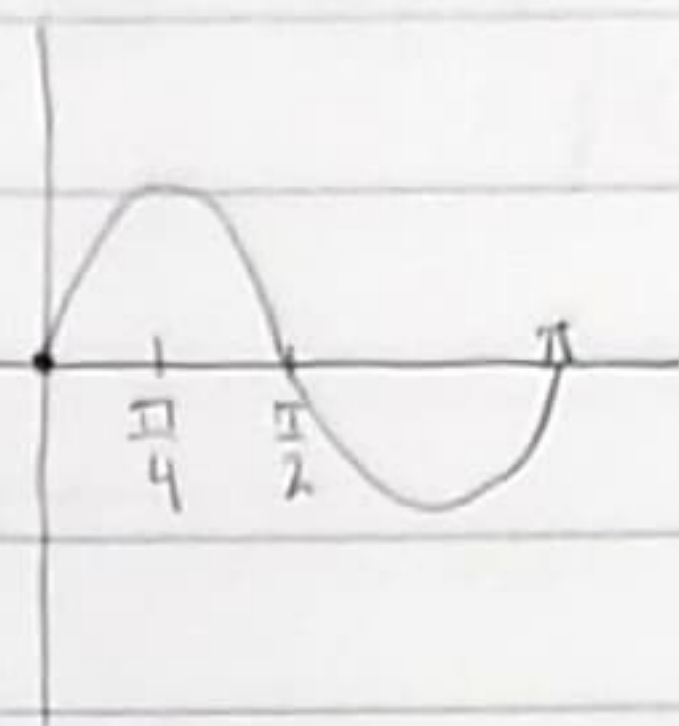


$y = \sin(2x)$ → if it's > 1 , compress 
 < 1 , expand 



period: 2π

$\sin 2x =$



period: π

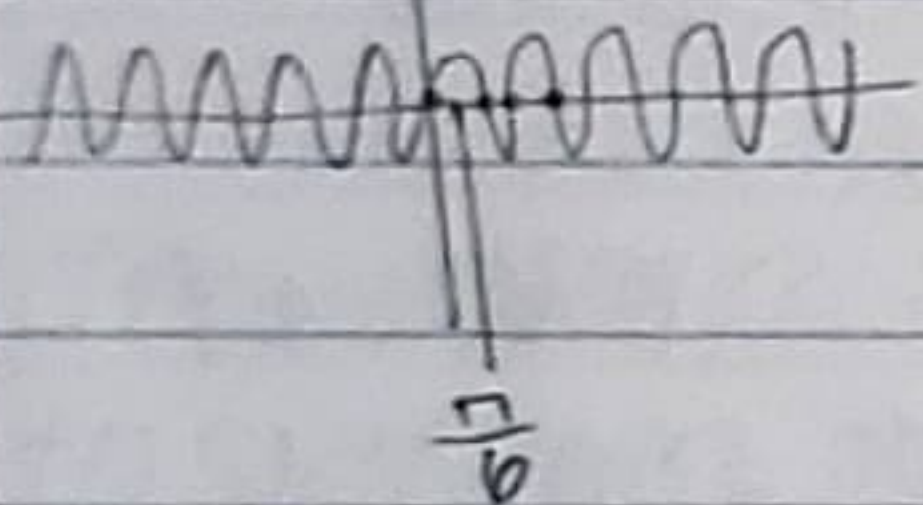
Difference between phase shift + scale

$\sin(2x)$ vs $\sin 2(x + \pi)$

$= \sin(2x + 2\pi) = \sin(2x)$ since they're coterminal; differ by 2π

$y = \sin(3x)$

$\pi =$ when x crosses 4 times



period = $2\pi/3$ → $y = \sin(3x + 2\pi)$?

▷ A func of f is said to be periodic with period T if $f(x+T) = f(x)$ for all of x

so $y = \sin 3x$ is periodic w/ period of $\frac{2\pi}{3}$ because $f(x + \frac{2\pi}{3}) = \sin(3(x + \frac{2\pi}{3}))$

$$= \sin(3x + 2\pi)$$

$$= \sin 3x = f(x)$$

▷ more generally, the func $\sin(ax)$ is periodic with period $\frac{2\pi}{|a|}$

office hours

M, F 11-12

T, T 2-3

amplitude

$$f(x) = A \sin(\omega x - \phi)$$

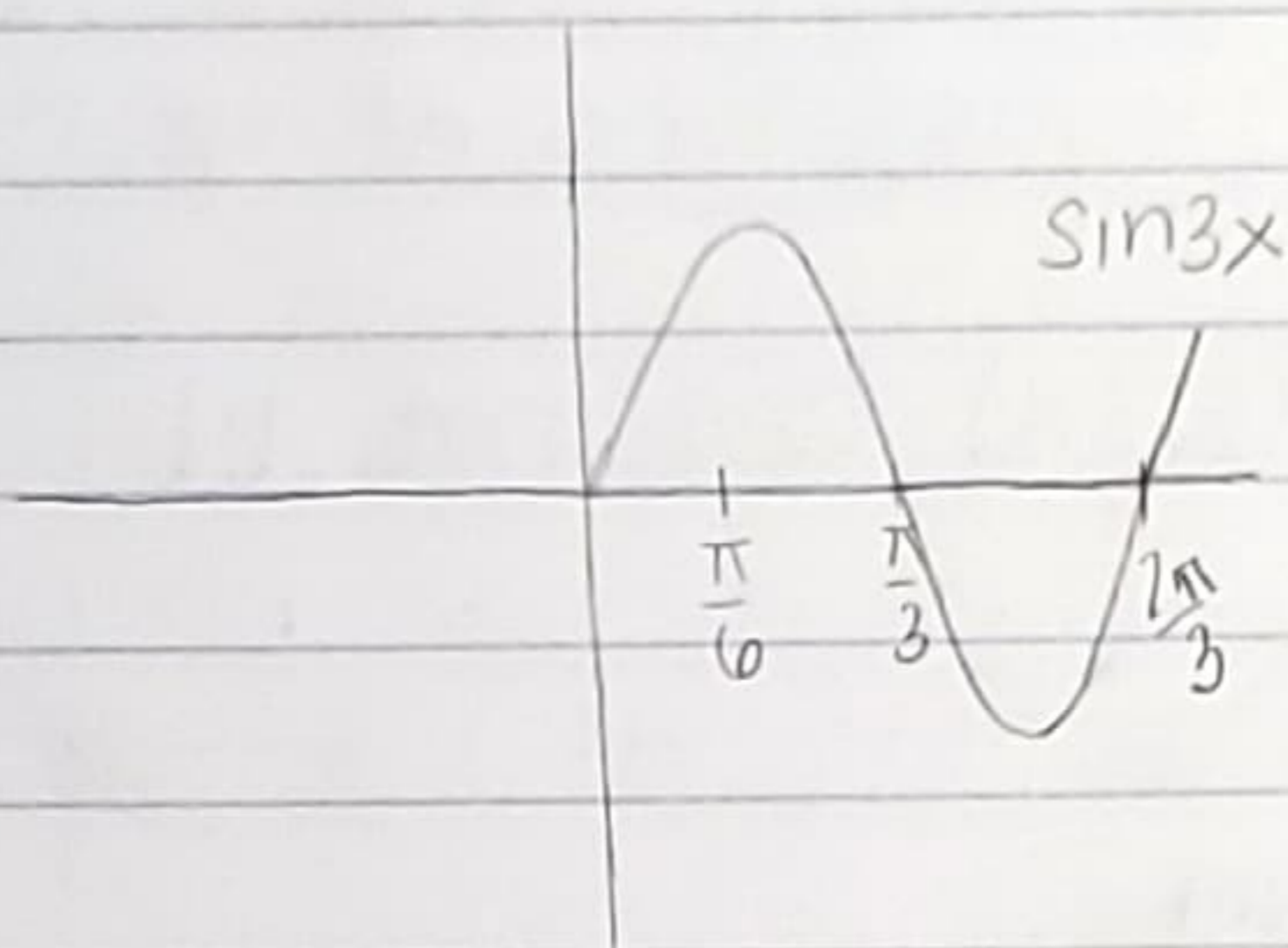
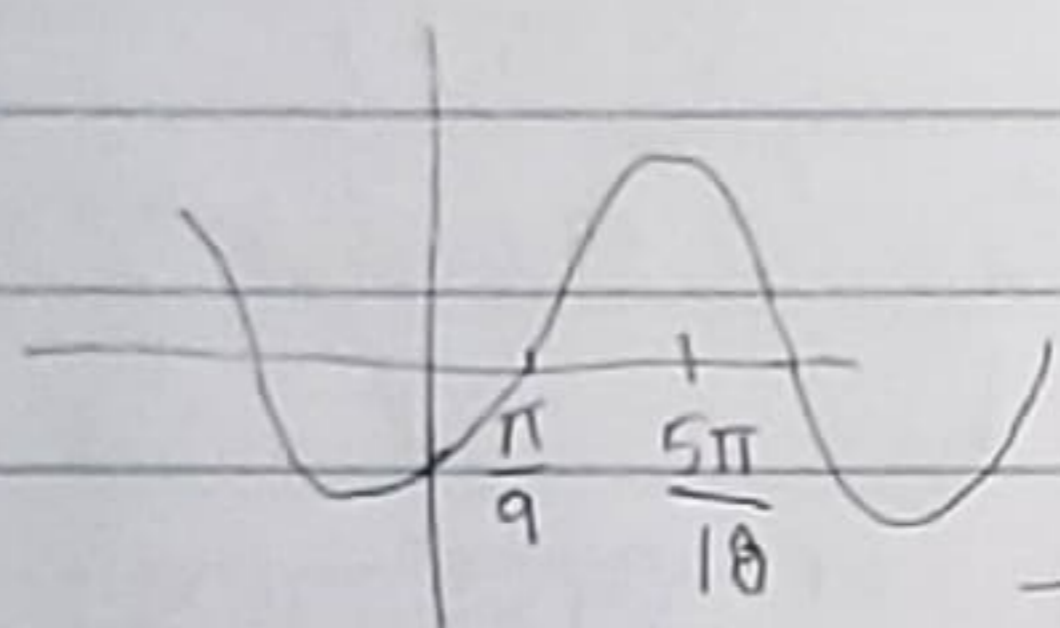
angle of
freq.

phase shift

ex

$$f(x) = 2 \sin\left(3x - \frac{\pi}{3}\right)$$

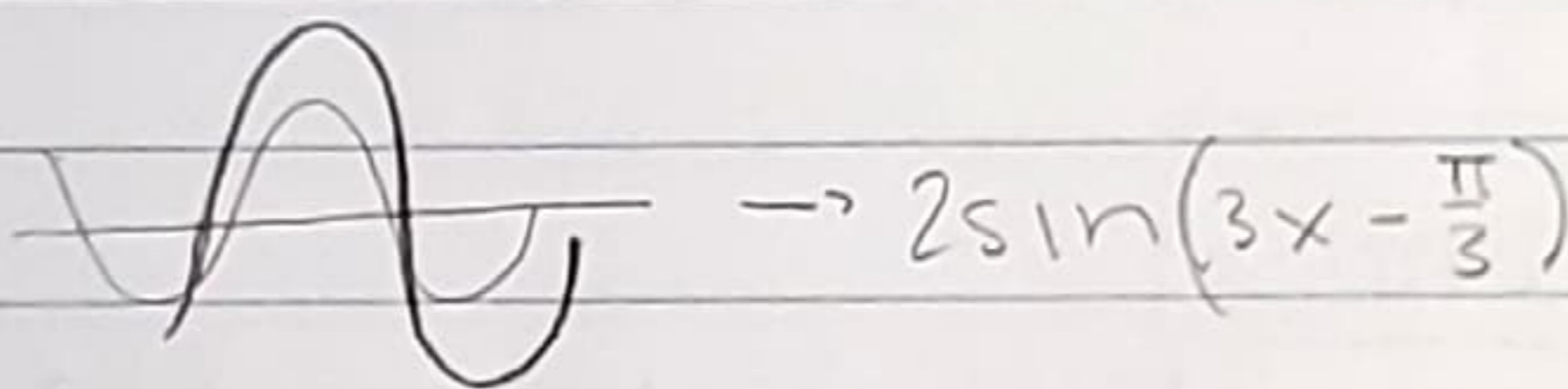
$$= 2 \sin\left(3\left(x - \frac{\pi}{9}\right)\right)$$



→ period is the same after the shift $\left(\frac{2\pi}{3}\right)$

just the starting place is different

then scale by 2 →



$$f(x) = 2 \sin x + 5 \cos x$$

$$A = \sqrt{2^2 + 5^2} = \sqrt{29}$$

$$f(x) = \sqrt{29} \left(\frac{2}{\sqrt{29}} \sin x + \frac{5}{\sqrt{29}} \cos x \right)$$

use calculator to find ϕ :

$$\sin \phi = \frac{2}{\sqrt{29}}, \quad \cos \phi = \frac{5}{\sqrt{29}}$$

\sin^{-1} \cos^{-1}

$$\sqrt{29} (\sin \phi \sin x + \cos \phi \cos x) = \sqrt{29} (\cos(x - \phi))$$

period of sum

15 MAY 2023

$$f(x) + g(x)$$

$$3\pi \quad 4\pi$$

what's the period. → 12π , have to find the common multiple

