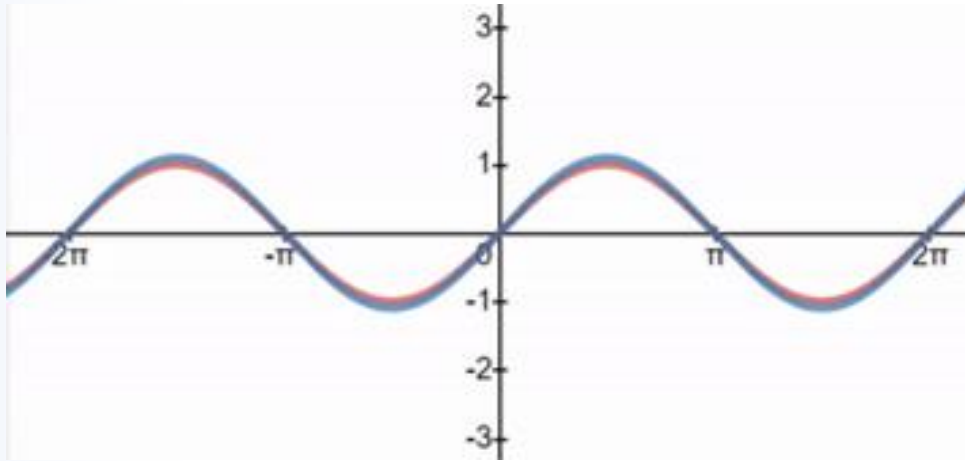


# Graphs of Trigonometric Functions

## Trigonometry

14



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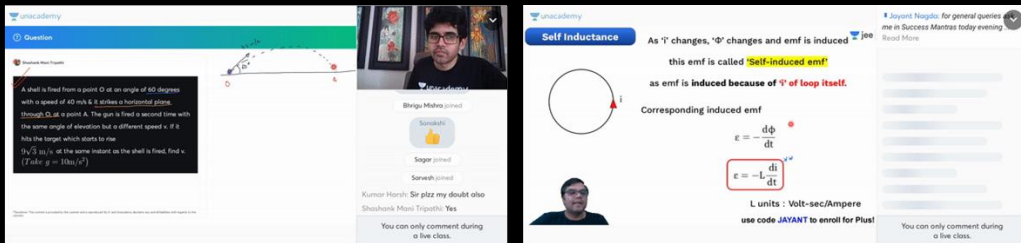
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Questions

A shell is fired from a point O at an angle of 60 degrees with a speed of 40 m/s & it strikes a horizontal plane through O at a point A. The gun is fired a second time with the same angle of elevation but a different speed  $v$ . If it hits the target which starts to rise  $(\sqrt{3}/2) \text{ m/s}^2$  at the same instant as the shell is fired, find  $v$ . (Take  $g = 10 \text{ m/s}^2$ )

Shreyas Mishra joined

Sagar joined

Saravali joined

Kumar Harsh: Sir plz my doubt also

Shashank Masi Tripathi: Yes

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**Self Inductance**

As  $\vec{I}$  changes,  $\vec{\Phi}$  changes and emf is induced

this emf is called **Self-induced emf**

as emf is induced because of  $\vec{I}$  of loop itself.

Corresponding induced emf

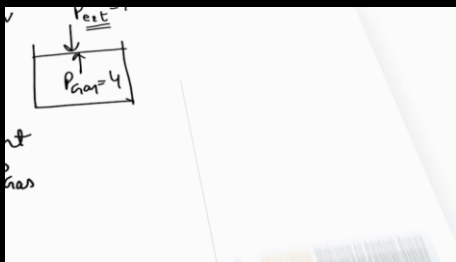
$$\mathcal{E} = -\frac{d\Phi}{dt}$$

$$\mathcal{E} = -L \frac{dI}{dt}$$

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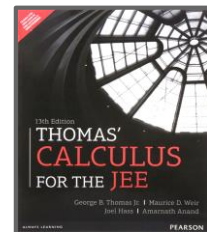
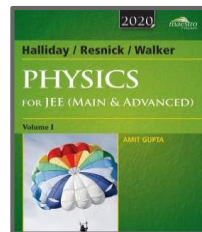
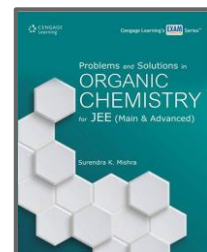
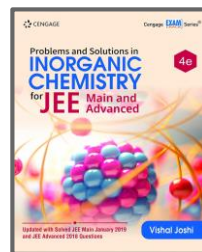
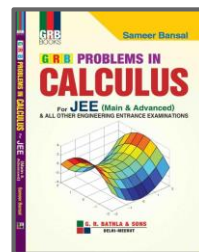
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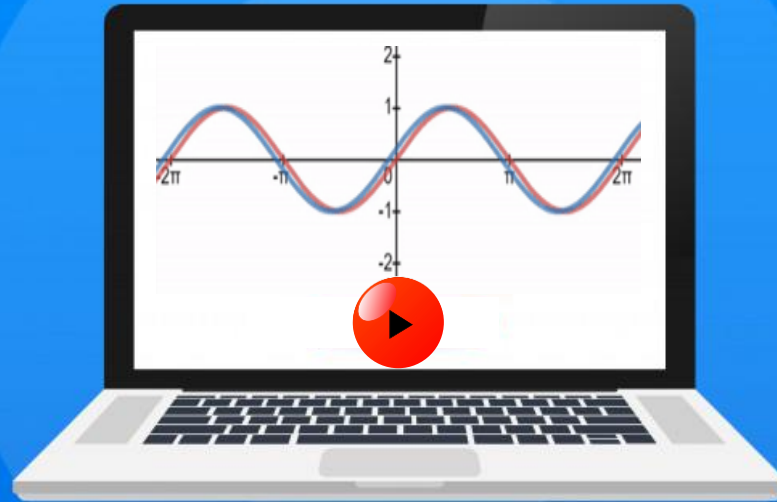
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# LET'S BEGIN!!

# Graphical Transformations

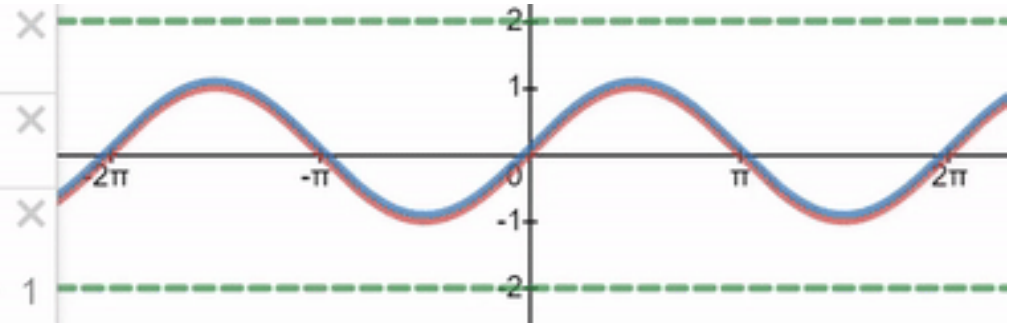
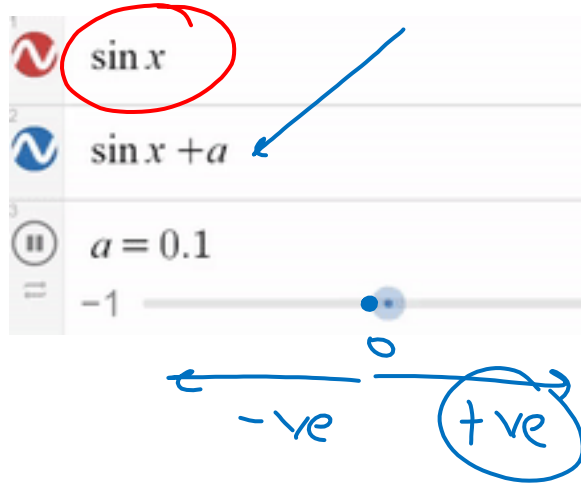




1.

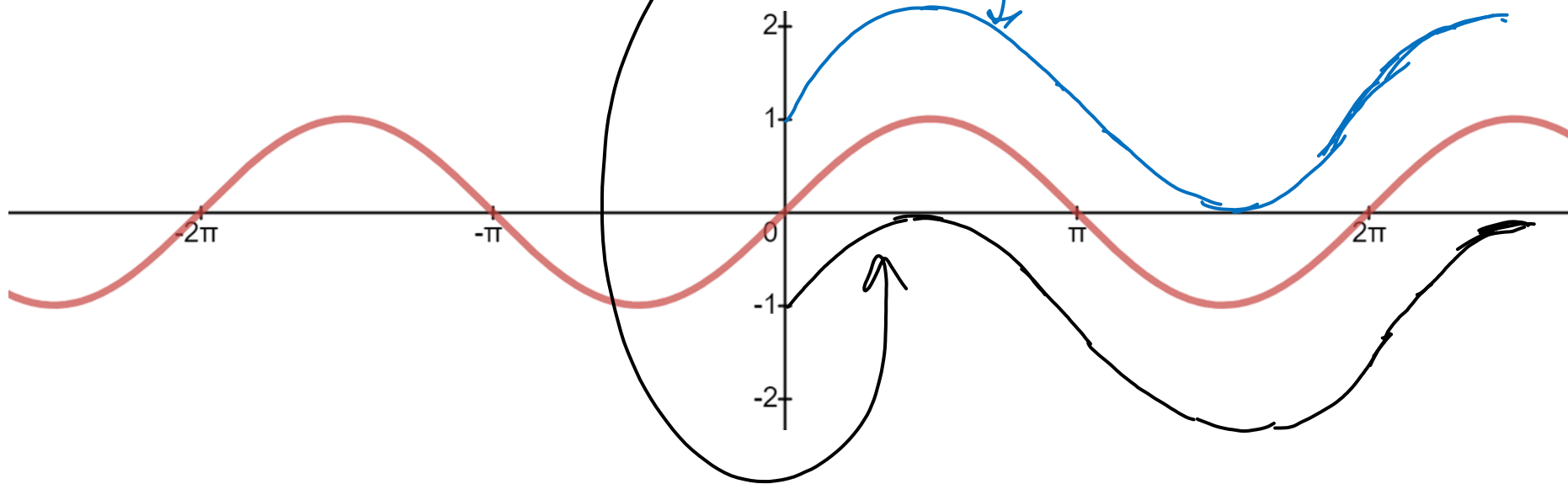
$$y = f(x) \pm a$$

Shift up or down by a units





Draw the graph of  $f(x) = \sin x + 1$  ;  $g(x) = \sin x - 1$

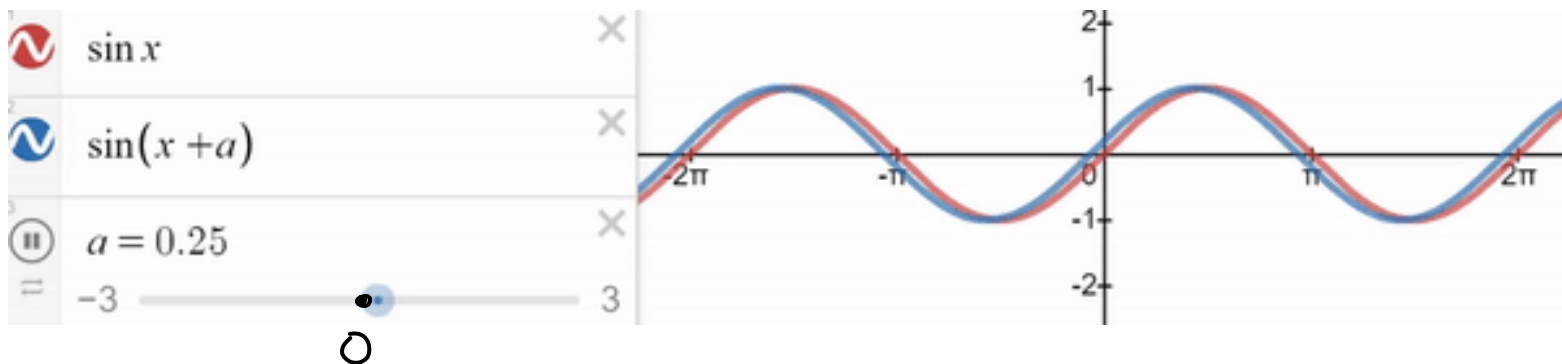




2.

$$y = f(x \pm a)$$

Shift left or right by a units



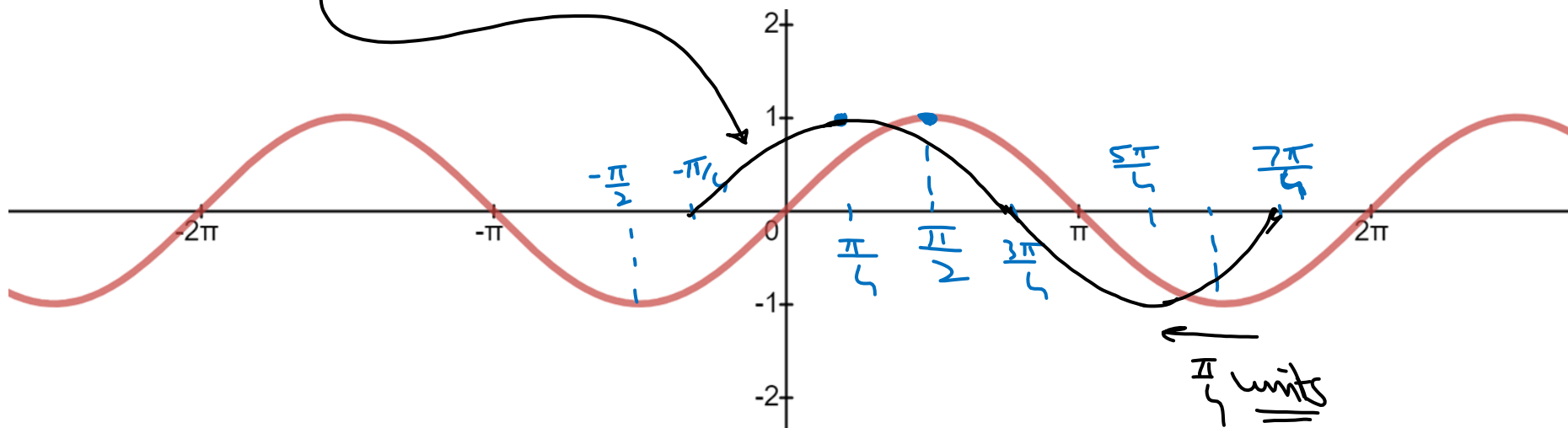
$+a$  : left  
 $-a$  : right



Draw the graph of

$$f(x) = \sin\left(x + \frac{\pi}{4}\right) \quad ; \quad g(x) = \sin\left(x - \frac{\pi}{4}\right)$$

=



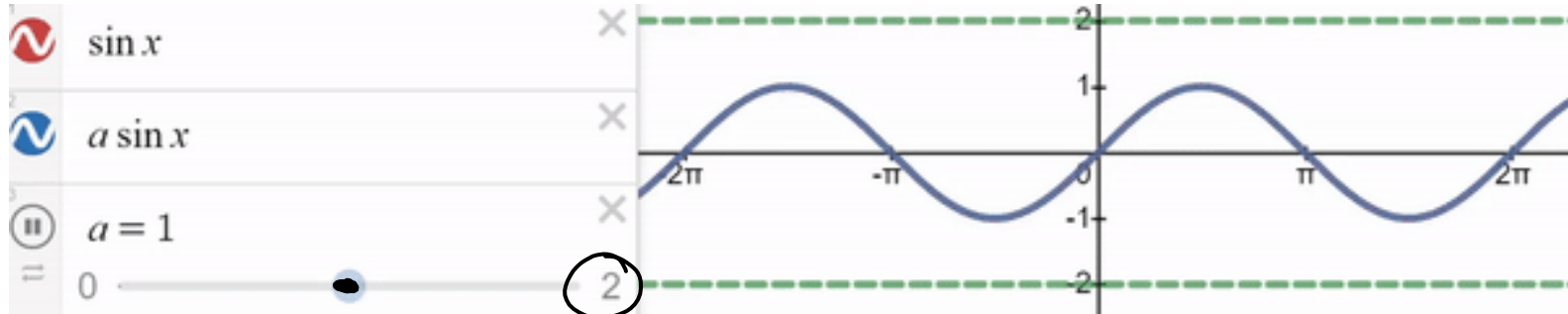




3.

$$y = a.f(x)$$

Stretch or compress about y-axis

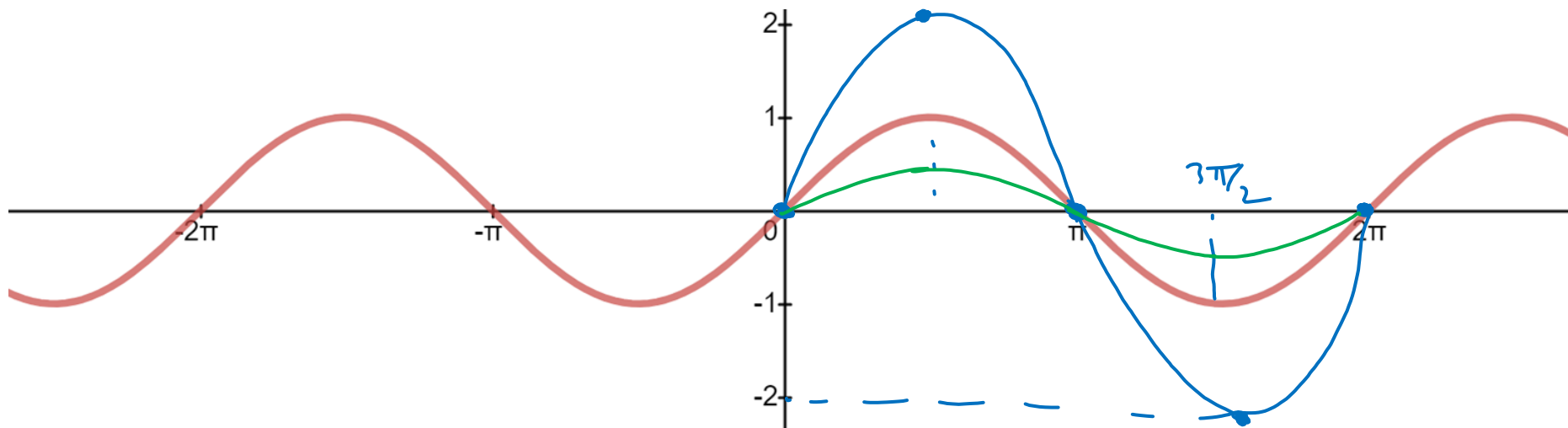


Compress      Stretch

$y = 2 \sin x$



Draw the graph of  $f(x) = 2\sin x$  ;  $g(x) = (1/2) \sin x$

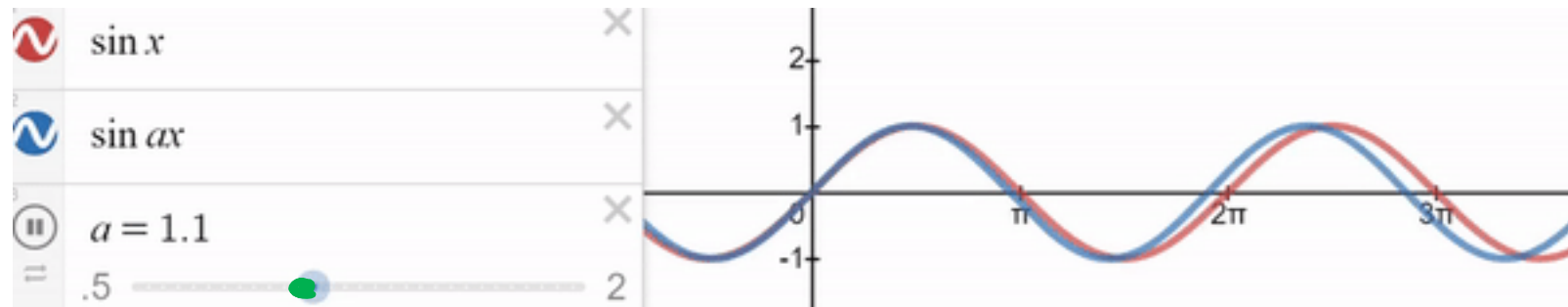




4.

$$y = f(ax)$$

Stretch or compress about x-axis



Handwritten notes and arrows from the slider:

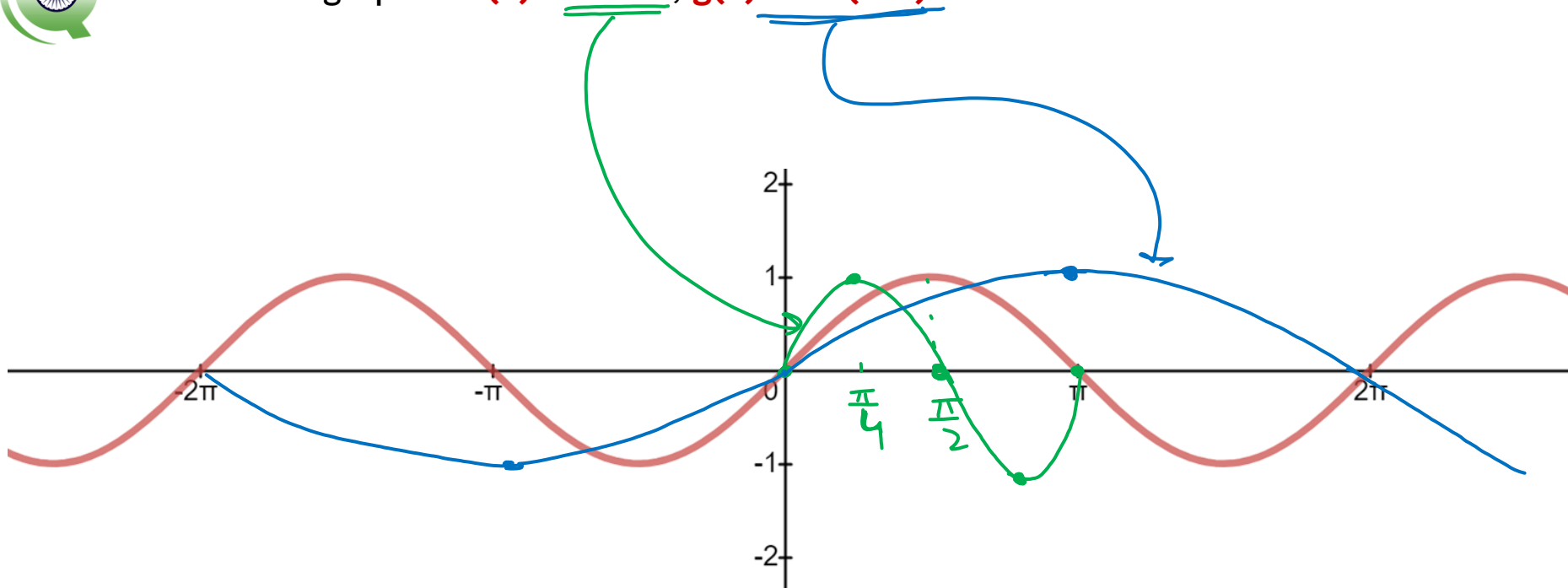
- Arrow from 0.5 to  $\frac{1}{2}$
- Arrow from  $\frac{1}{2}$  to  $y = \sin \frac{x}{2}$  (circled)

Handwritten note and arrow from the  $a = 1.1$  setting:

- Arrow from  $a = 1.1$  to  $f = \sin 2x$  (circled)



Draw the graph of  $f(x) = \sin 2x$  ;  $g(x) = \sin(x/2)$

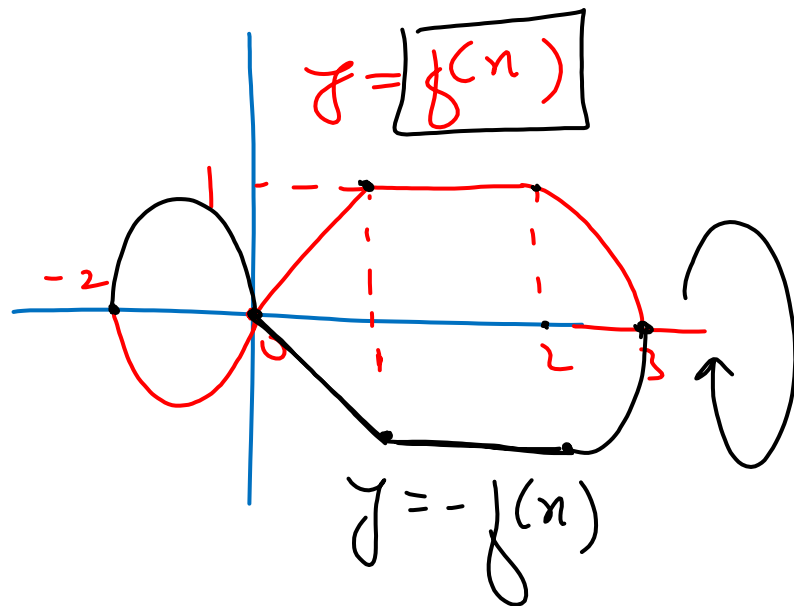




5.

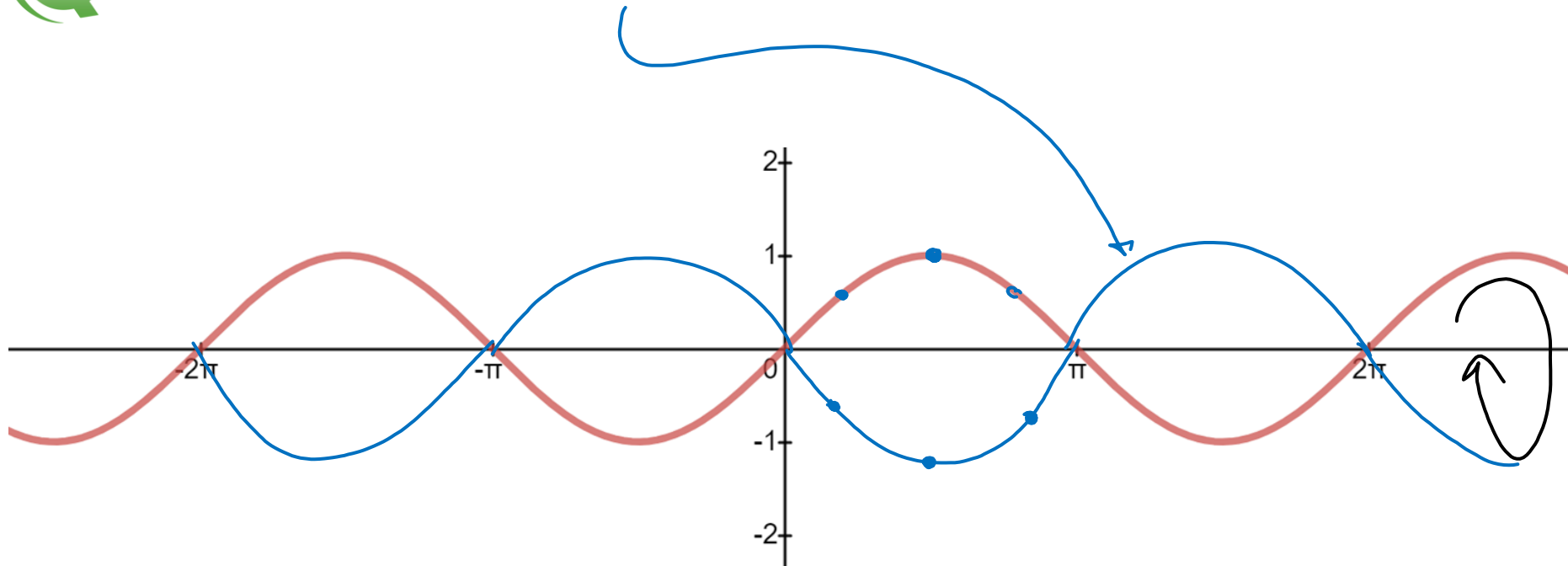
$$y = -f(x)$$

Flip about x-axis





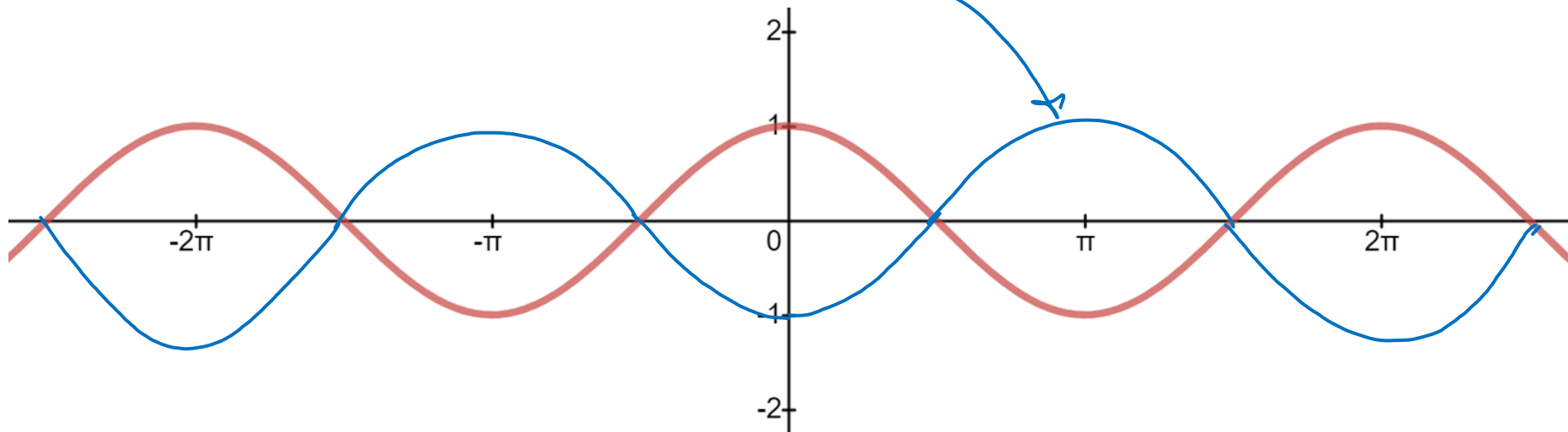
Draw the graph of:  $f(x) = -\sin x$







Draw the graph of:  $f(x) = -\cos x$

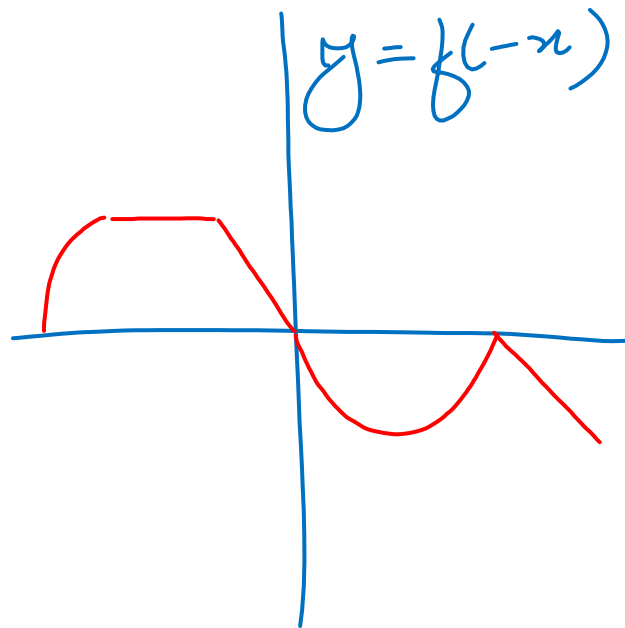
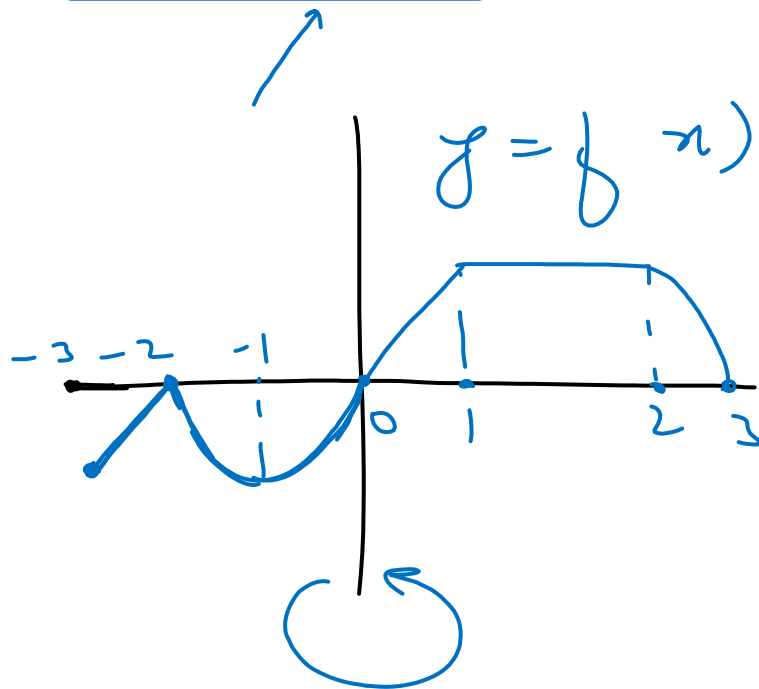




6.

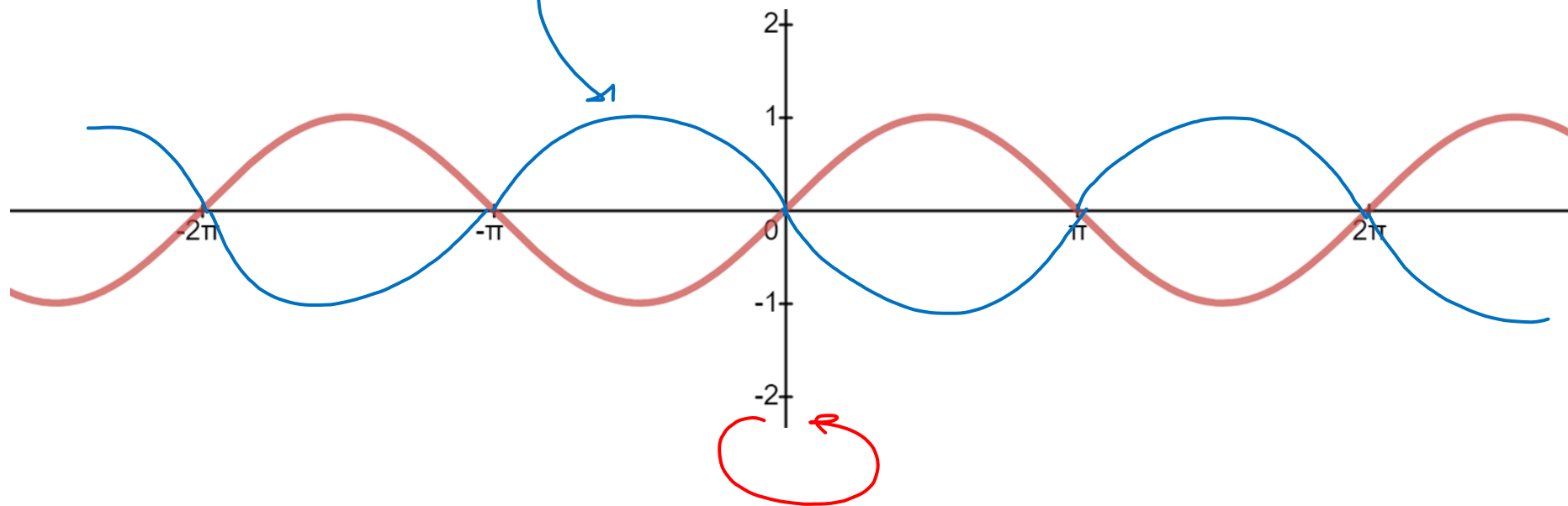
$$y = f(-x)$$

Flip about y-axis





Draw the graph of:  **$f(x) = \sin(-x)$**





7.

$$y = |f(x)|$$

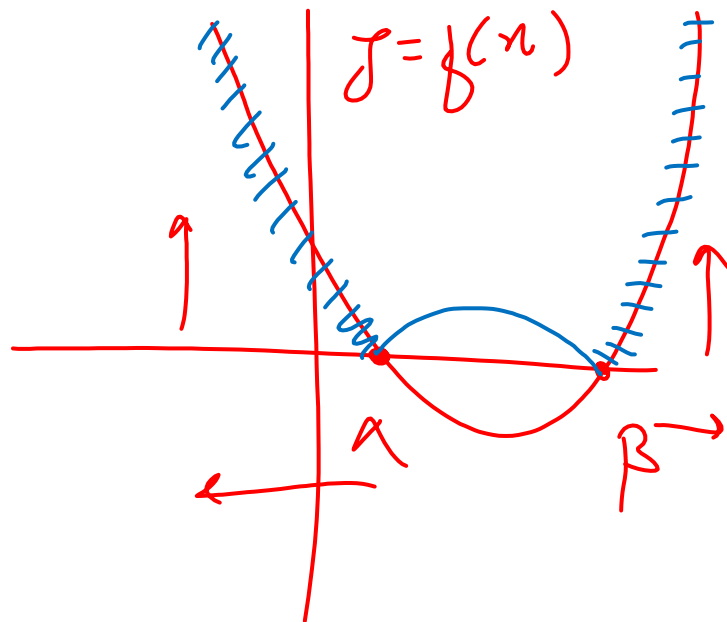
Reflect only the portion below x-axis about x-axis

$$f(x) + ve$$

$$y = f(x)$$

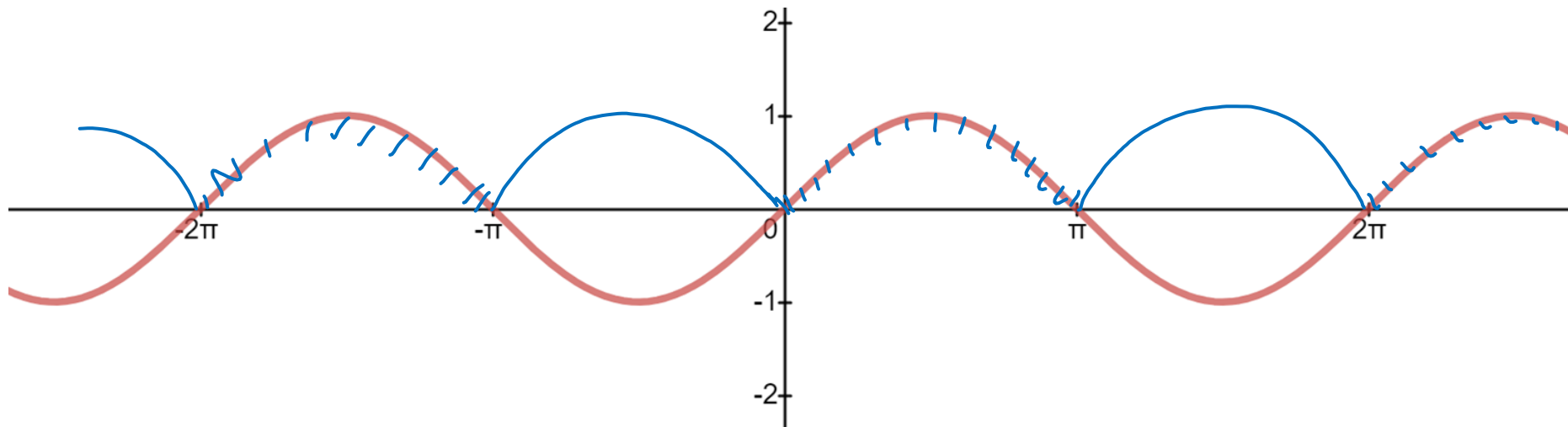
$$f(x) - ve$$

$$y = -f(x)$$





Draw the graph of  $f(x) = |\sin x|$

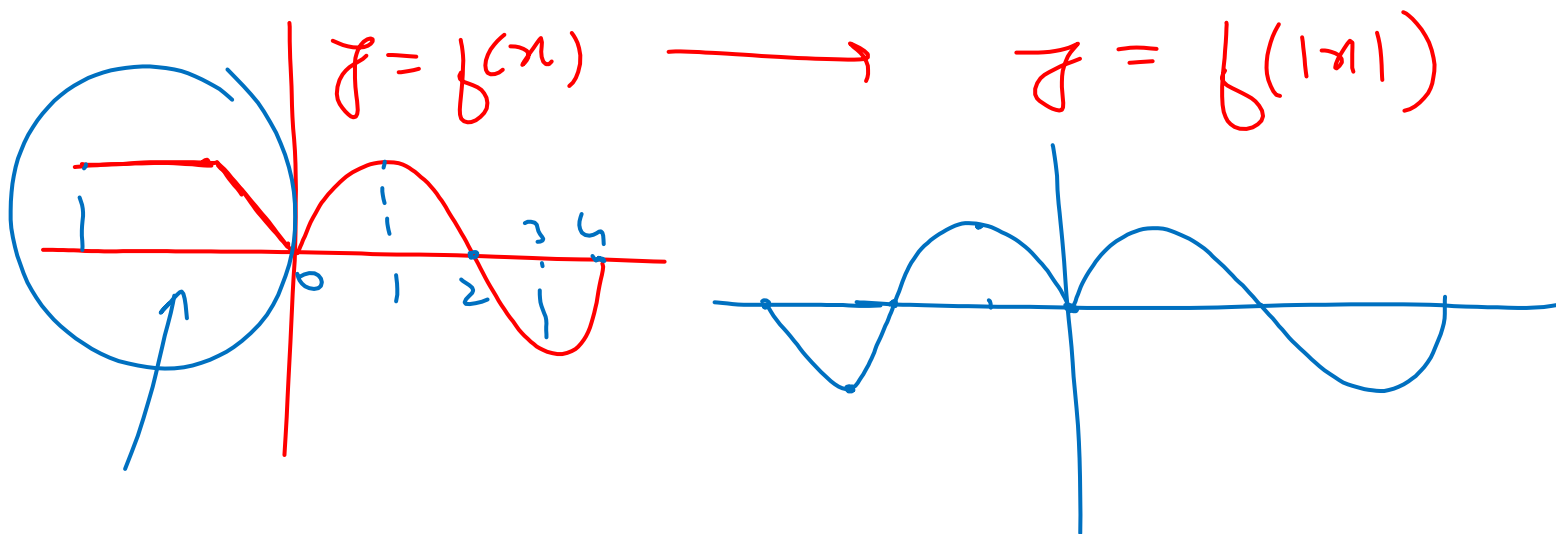




8.

$$y = f(|x|)$$

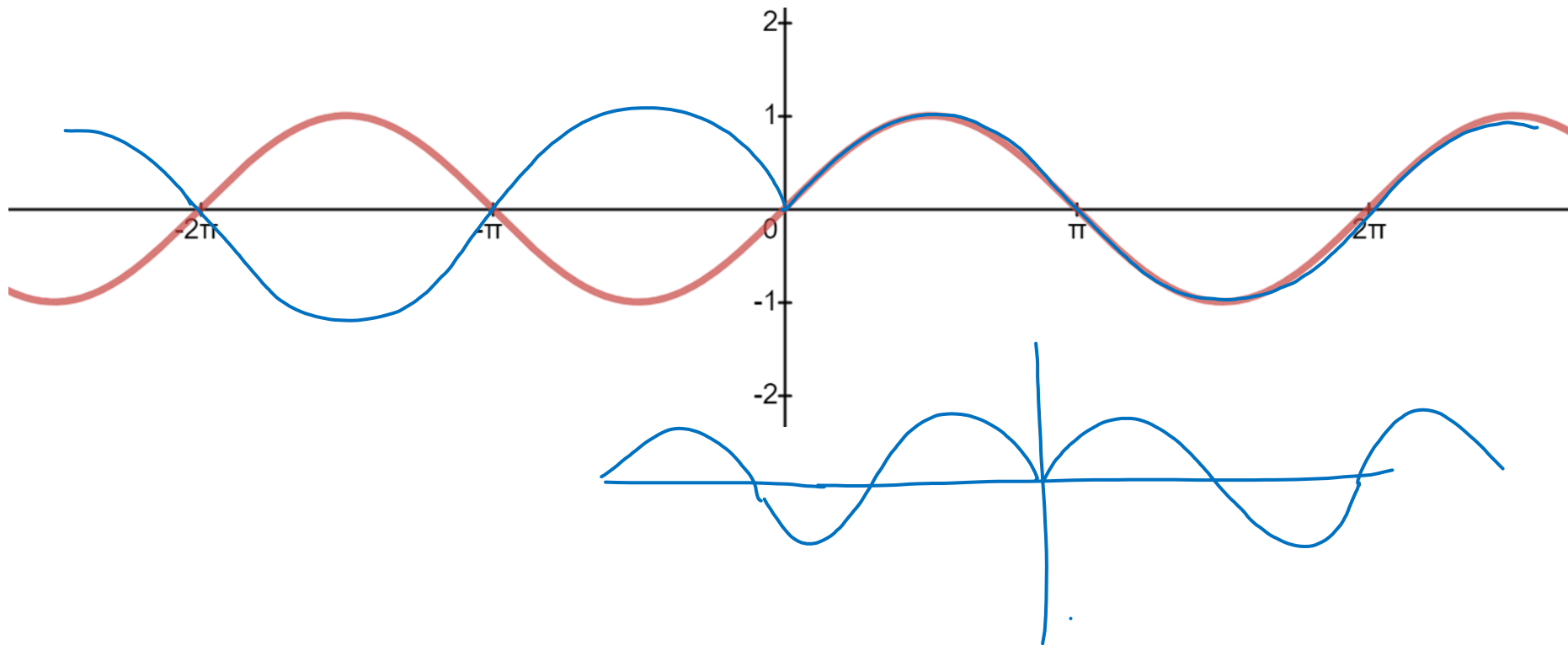
Keep only the portion right of y-axis and then reflect it, about y-axis, keeping original portion intact.







Draw the graph of  $g(x) = \sin|x|$

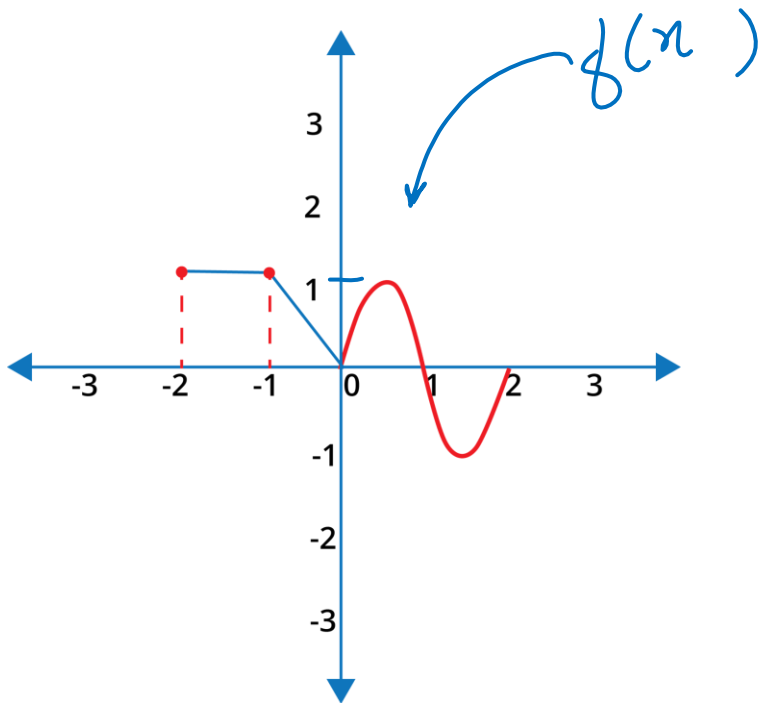




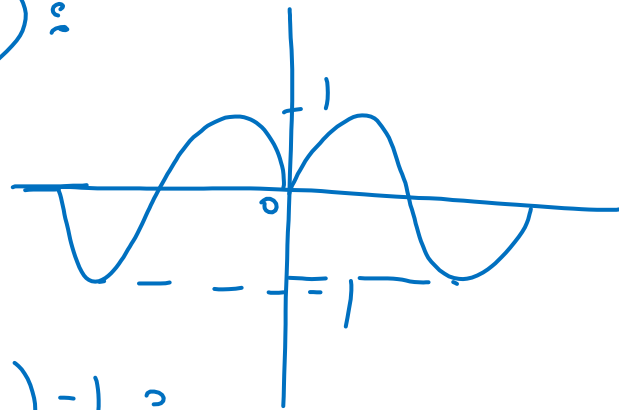


If the graph of  $f(x)$  is as shown:

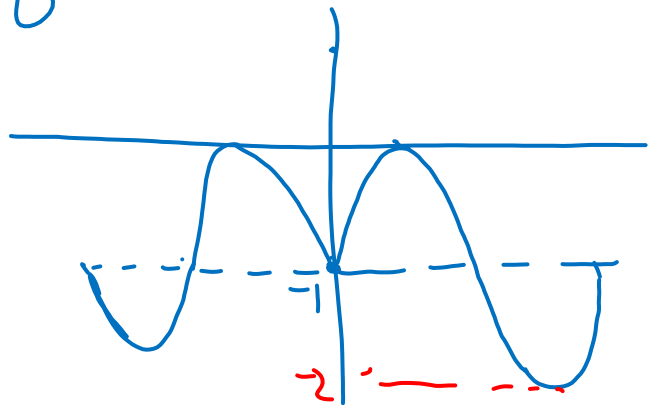
Draw the graph of  $y = |f(|x|) - 1|$



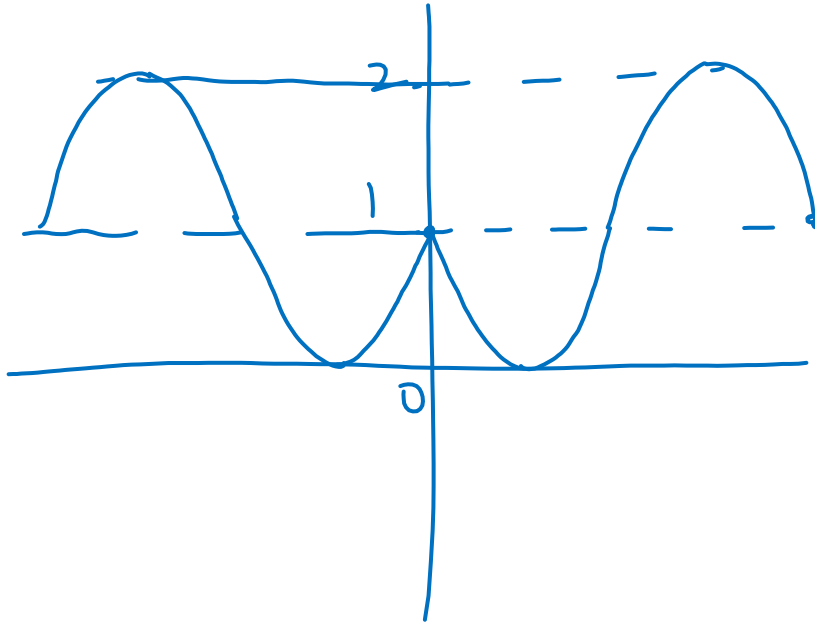
$$f(|x|) =$$



$$|f(|x|) - 1| =$$



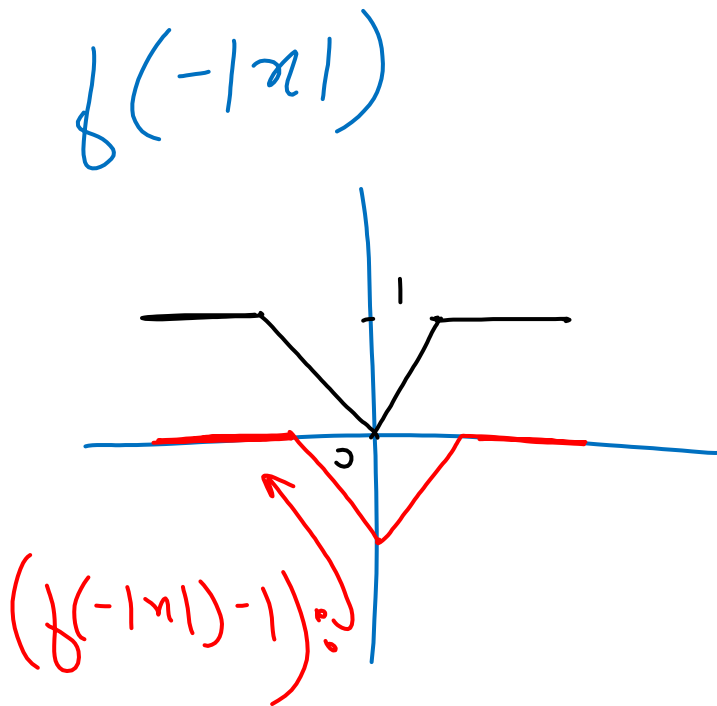
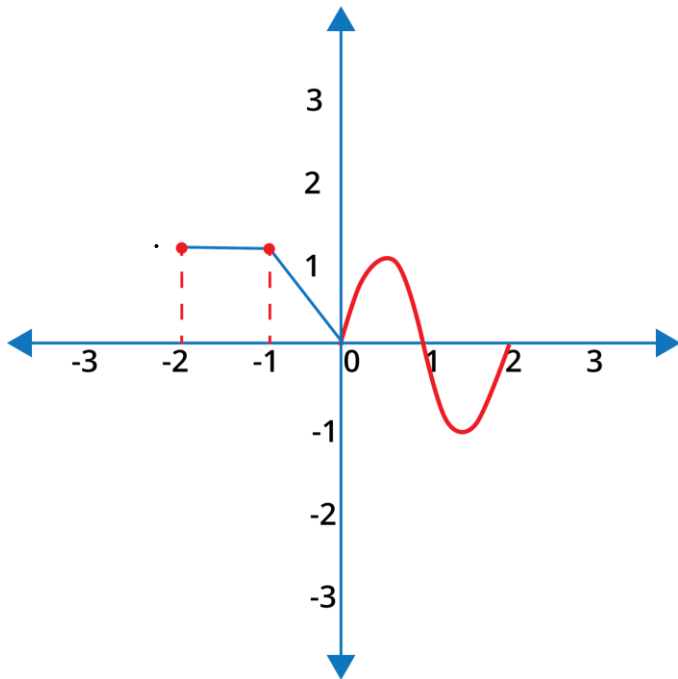
$$|f(x) - 1| \leq 2$$

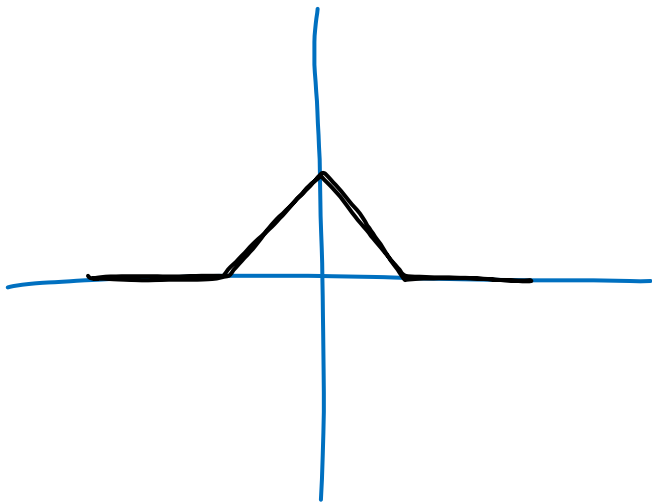




If the graph of  $f(x)$  is as shown:

Draw the graph of  $y = |f(-|x|) - 1|$









Find the number of solutions of  $\underline{2\sin x} = [x]$   
(where  $[.]$  is greatest integer function).

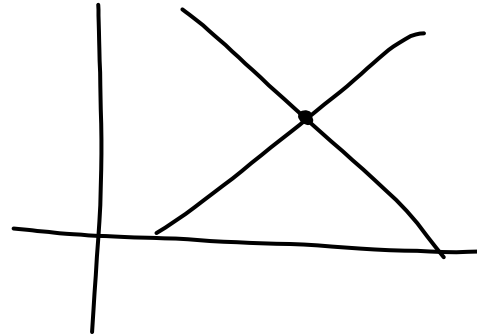
$$f = LHS \Rightarrow f = 2\sin x$$

$$g = RHS \Rightarrow g = [x]$$

$$\boxed{m_1 x + c_1} = \boxed{m_2 x + c_2}$$

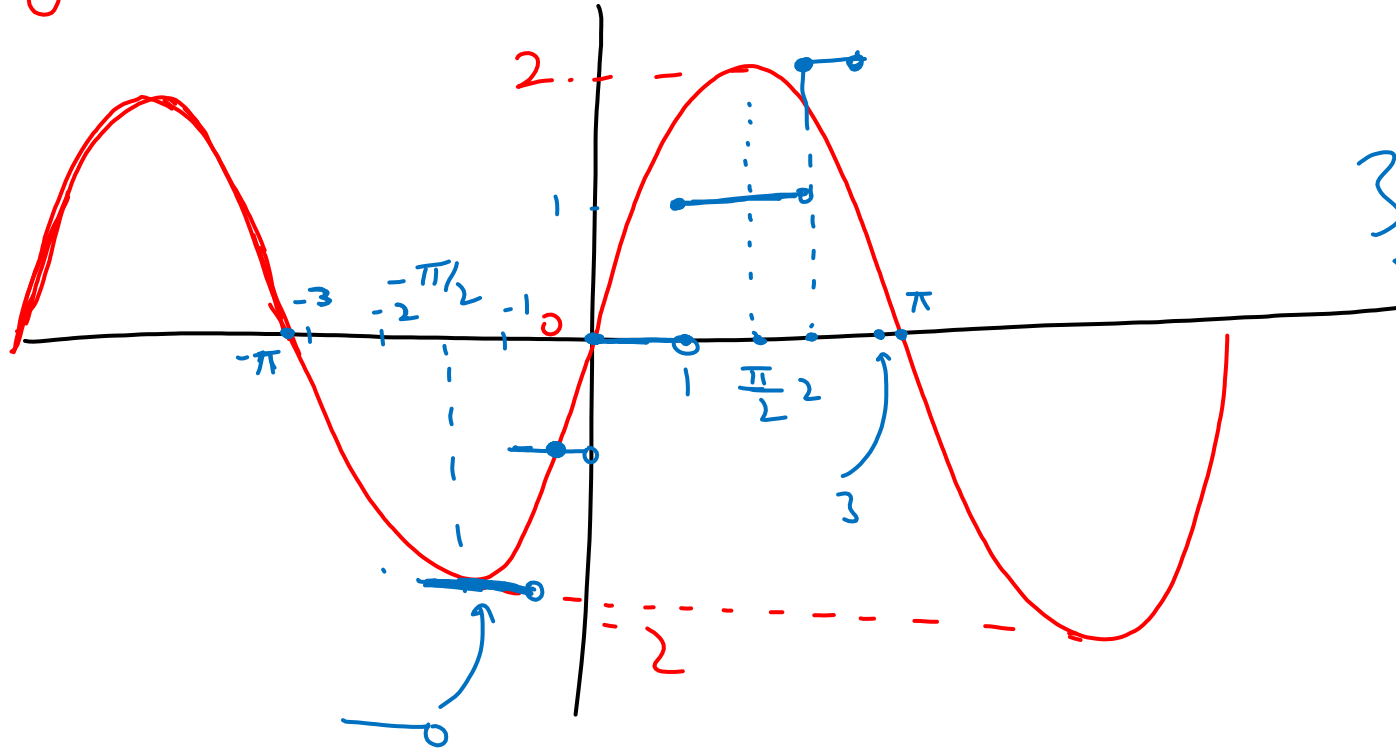
$$L_1 : y = m_1 x + c_1$$

$$L_2 : y = m_2 x + c_2$$



$$y = 2 \sin x$$

$$\rightarrow y = [x]$$



3 sol's



Find the number of solutions of  $x - 7|\sin x| = 0$

$$x = 7|\sin x|$$

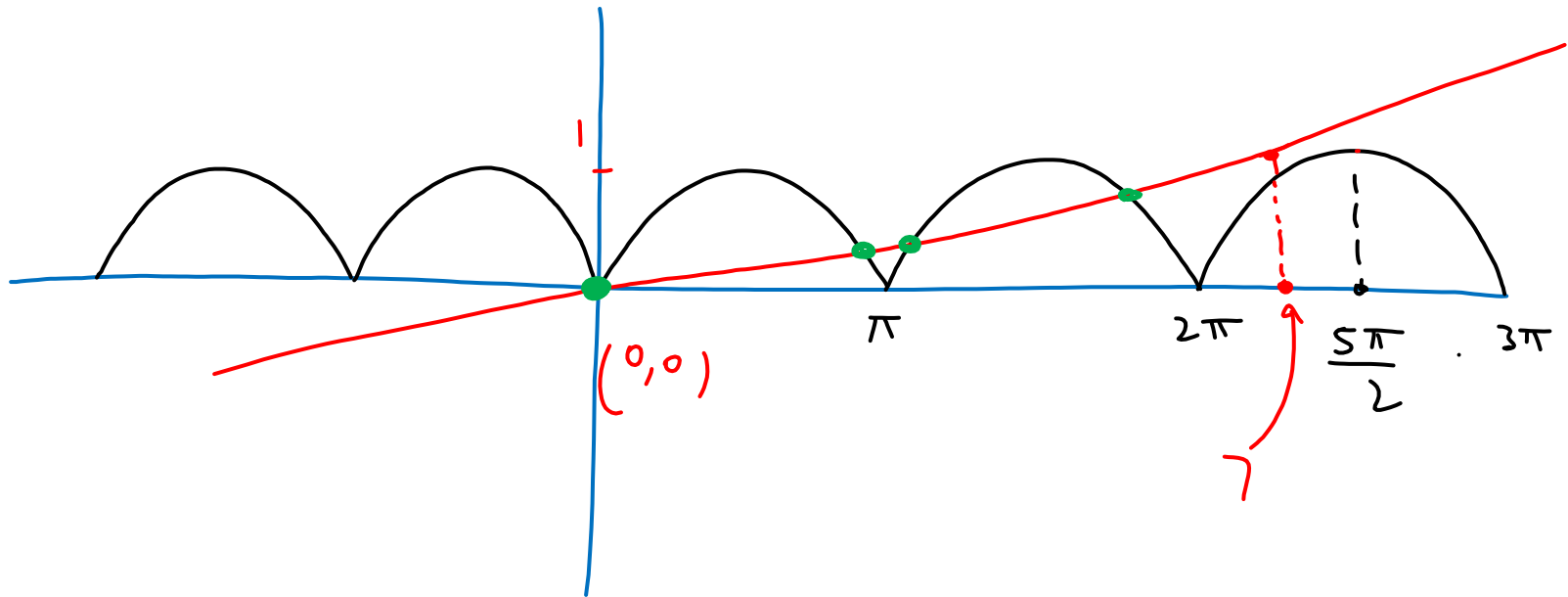
$$\frac{x}{7} = |\sin x|$$

$$f = \frac{x}{7}$$

$$f = |\sin x|$$

$$y = |\sin x|$$

$$(0,0) \mid y = \frac{x}{7} \quad (7,1)$$

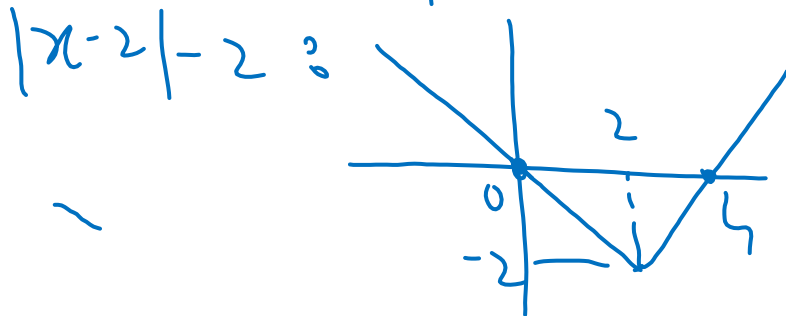
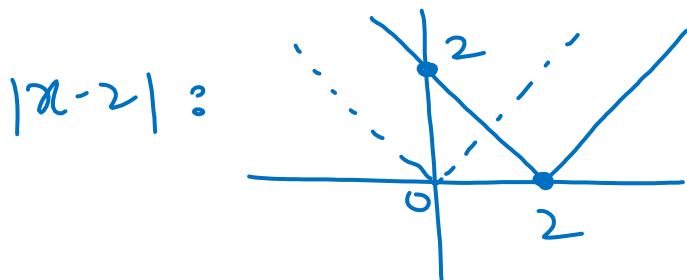




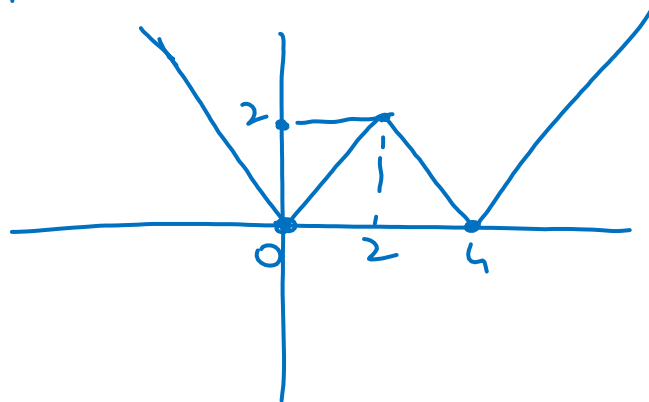
Find the number of solutions of

$$|||x - 2| - 2| - 2| = 1$$

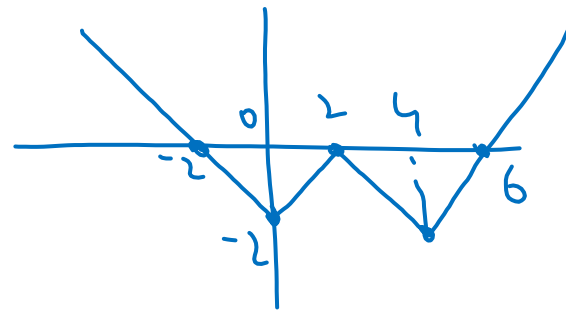
$$f = |||x - 2| - 2| - 2|$$



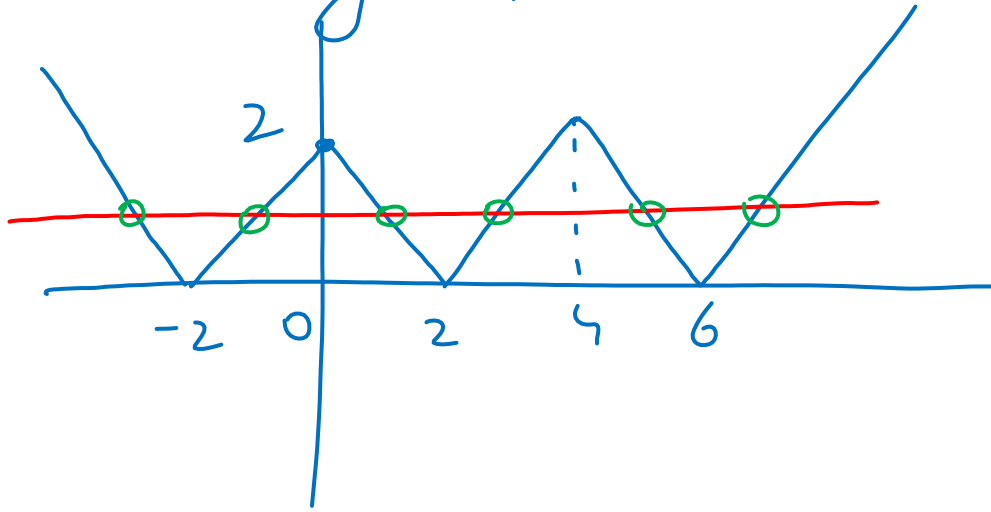
$$||x - 2| - 2|$$



$$|||x - 2| - 2| - 2|$$



$$y = |||x-2|-2|-2|$$





# #JEELiveDaily Schedule



11<sup>th</sup>



Namo Sir | Physics

6:00 - 7:30 PM



Ashwani Sir | Chemistry

7:30 - 9:00 PM



Sameer Sir | Maths

9:00 - 10:30 PM

12<sup>th</sup>



Jayant Sir | Physics

1:30 - 3:00 PM



Anupam Sir | Chemistry

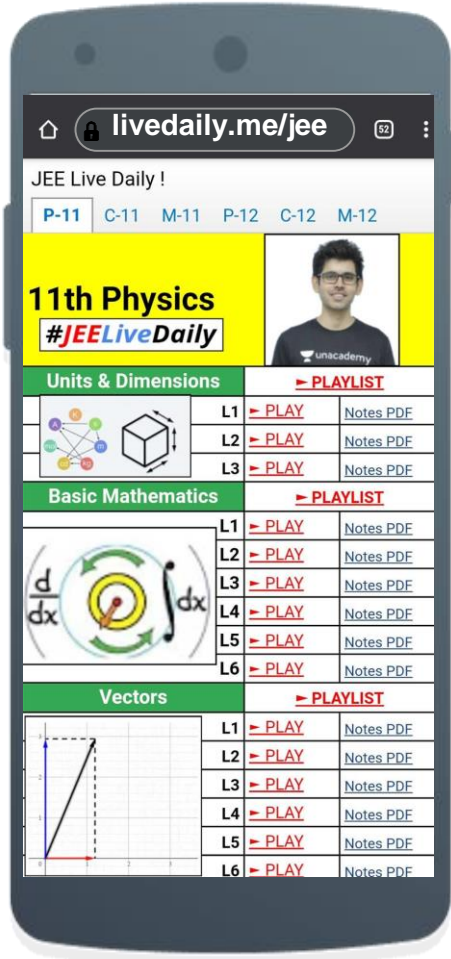
3:00 - 4:30 PM



Nishant Sir | Maths

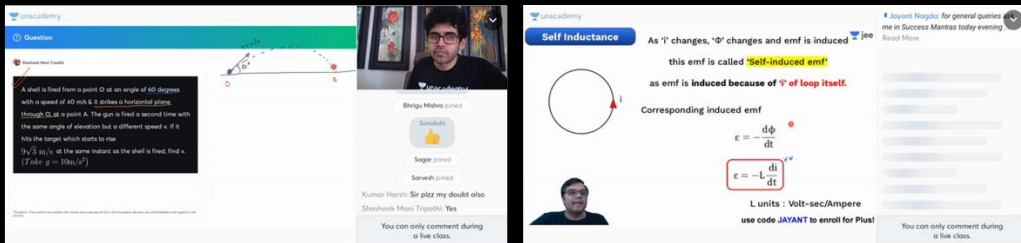
4:30 - 6:00 PM

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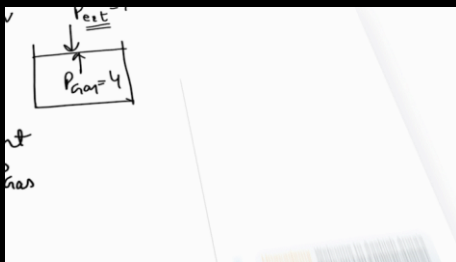




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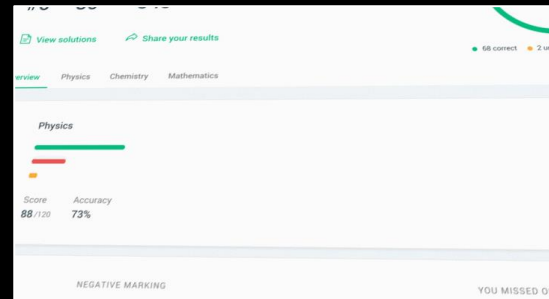
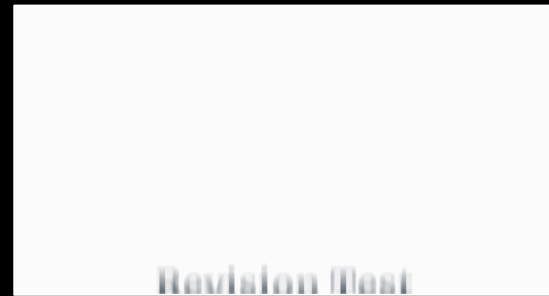


The image shows two screenshots from the Unacademy live class interface. The left screenshot displays a physics problem: "A shell is fired from a point O at an angle of 60 degrees with a speed of 40 m/s. It strikes a horizontal plane through O at a point A. The gun is fired a second time with the same angle of elevation but a different speed  $v$ . If it hits the target which starts to run  $(\sqrt{3}/2) \text{ m/s}$  at the same instant as the shell is fired, find  $v$ . (Take  $g = 10 \text{ m/s}^2$ )". The right screenshot shows a lecture on "Self Inductance" with the text: "As  $\vec{I}$  changes,  $\vec{\Phi}$  changes and emf is induced. This emf is called **Self-induced emf** as emf is induced because of  $\vec{I}$  of loop itself." It includes the formula for induced emf:  $\mathcal{E} = -\frac{d\Phi}{dt}$  and  $\mathcal{E} = -L \frac{di}{dt}$ , and mentions "L units: Volt-sec/Ampere".



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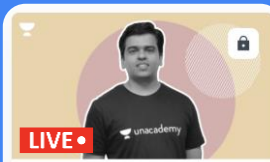


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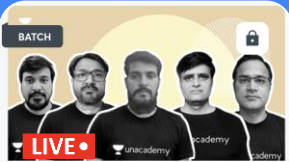
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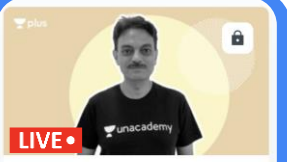
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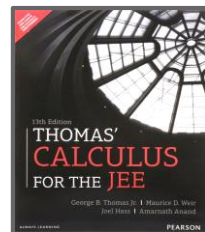
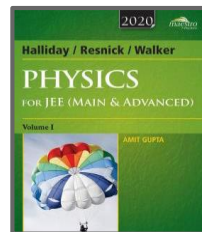
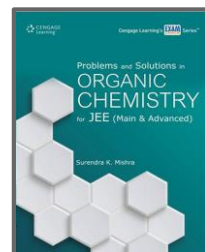
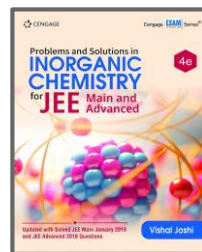
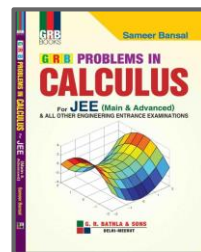
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Mihir Agarwal  
99.63



Akshat Tiwari  
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Kalankar  
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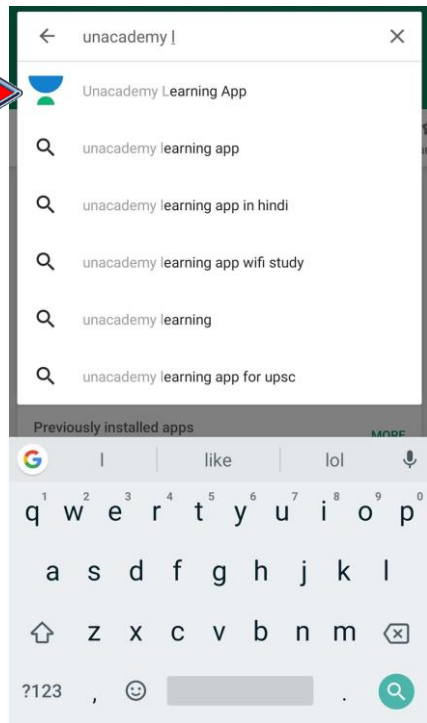


Naman Goyal  
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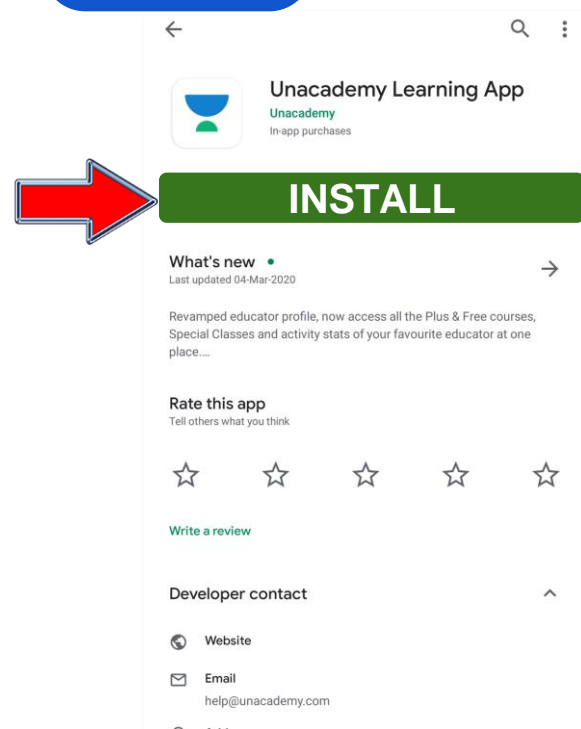


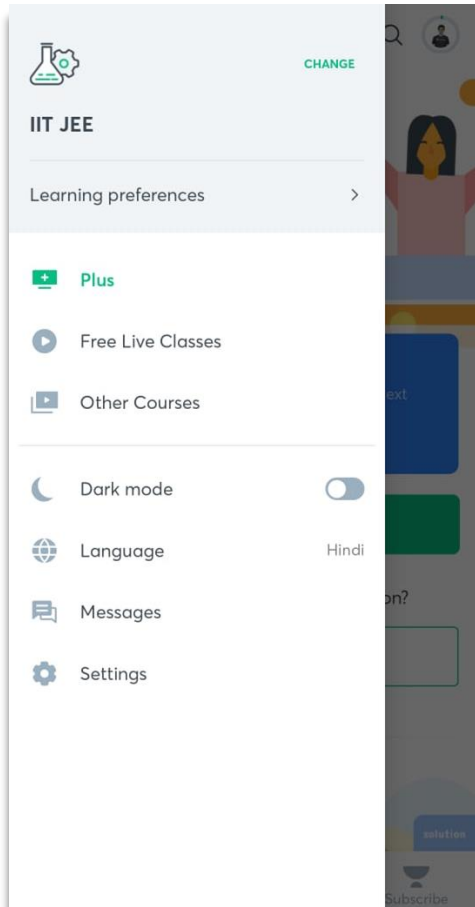
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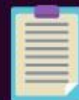
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