To graph any absolute valued functions of the form $g(x) = |f(x)|$ follow me on

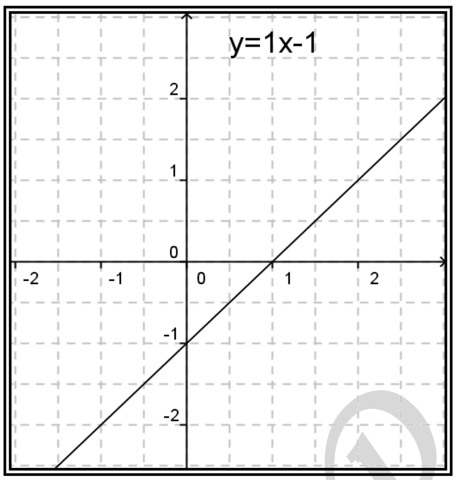
1. Graph the given function ***without absolute value***, point by point.

2. To include the absolute value in the graph of the given function:
   - ***i) Find*** the interval for which $f(x) < 0$ (that is curve is below $x-axis$)
   - ***ii) Reflect*** this part with respect to the $x-axis$ (Find symmetry $w.r.t\ x-axis$)

Applications:

Ex1: Consider the two functions f & g so that $f(x) = x - 1$ and $g(x) = |f(x)|$, graph f then deduce the graph of g.

Soln: 1st - Step



Therefore, we can say that

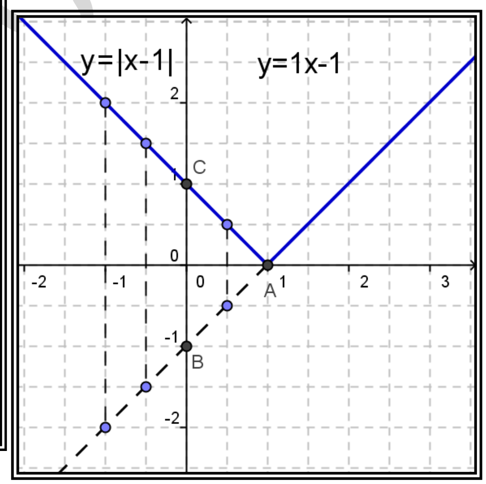
$$g(x) = |f(x)| = \begin{cases} f(x) & if\ x \geq 1 \\ -f(x) & if\ x \leq 1 \end{cases}$$

Comparing graphs of f & g we say

1) C_f & C_g are ***confounded*** if $x \geq 1$

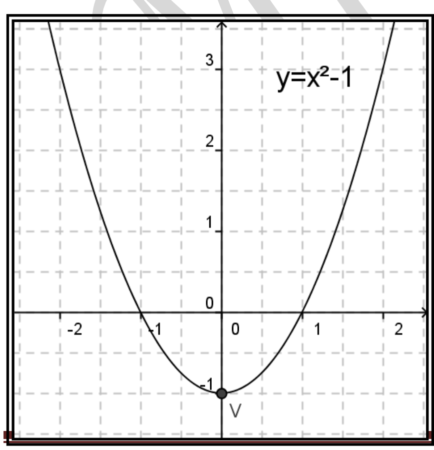
2) C_f & C_g are ***symmetric*** w.r.t $x-axis$ if $x \leq 1$

2nd - Step



Ex2: Consider the two functions h & k so that $h(x) = x^2 - 1$ and $k(x) = |h(x)|$, graph h then deduce the graph of k.

Soln: 1st - Step



Therefore, we can say that

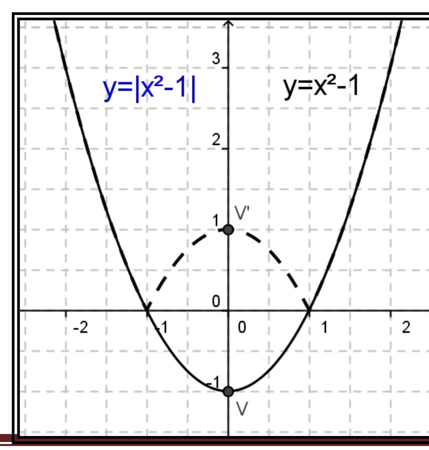
$$k(x) = \begin{cases} h(x) & if\ x \in]-\infty;-1] \cup [1;\infty[\\ -h(x) & if\ -1 \leq x \leq 1 \end{cases}$$

Comparing graphs of h & k we say:

a) C_h & C_k are ***confounded*** if $x \in]-\infty;-1] \cup [1;\infty[$

b) C_h & C_k are ***symmetric*** w. r.t $x-axis$ $-1 \leq x \leq 1$

2nd - Step



On your own:

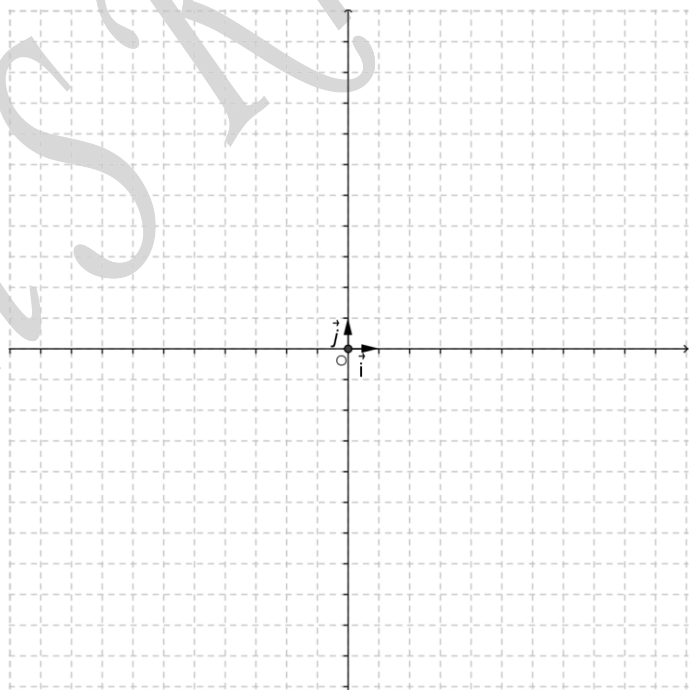
Consider the function $f : x \mapsto \frac{1}{x}$

1- Determine domain and parity of f .

……………………………………………………………..
……………………………………………………………..
……………………………………………………………..
……………………………………………………………..
……………………………………………………………..

2- Set up the table of variation of f over its domain.

x	
$f(x)$	



3- Graph on the orthonormal system $(O,\vec{i},\vec{j})$ the curve of f .

4- On the same system $(O,\vec{i},\vec{j})$ ***deduce*** the graph of a function $g(x) = |f(x)|$.

5- Write $g(x)$ in terms of $f(x)$.

$$g(x) = \begin{cases} \quad\quad\quad\quad\quad\quad \text{for all } x \\ \\ \quad\quad\quad\quad\quad\quad \text{for all } x \end{cases}$$

6- Deduce domain, and set up the table of variation of g.

x	
$g(x)$	

7- Compare graphs of f & g.

……………………………………………………………..
……………………………………………………………..
……………………………………………………………..

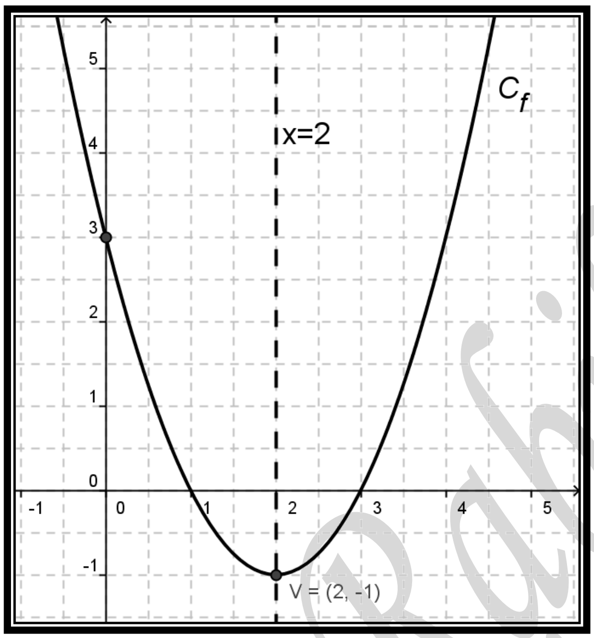
To graph any absolute valued functions of the form $g(x) = f(|x|)$

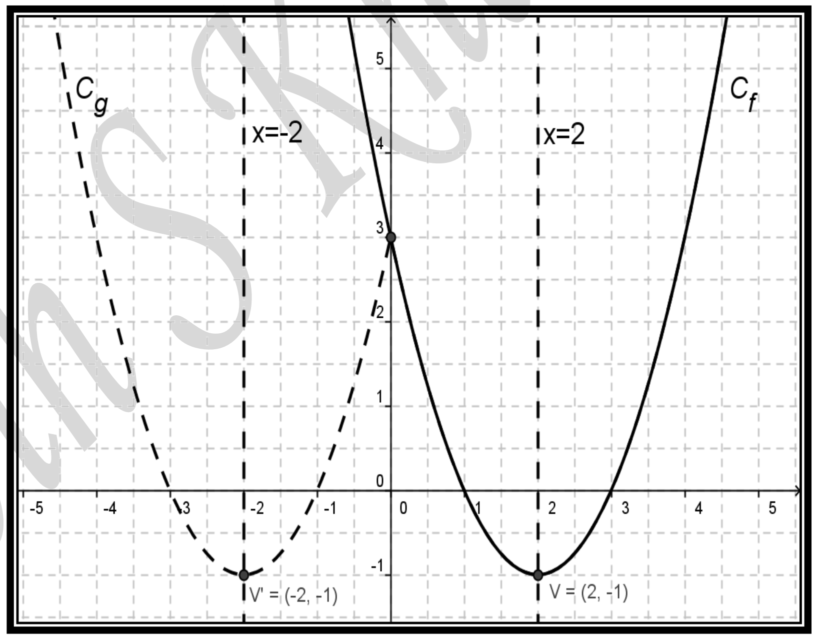
1. Graph the given function without absolute value point by point.
2. To include the absolute value in the graph of the given function:
   i) Find the interval for which $x > 0$
   ii) Reflect this part with respect to the $y-axis$ (find symmetry $w.r.t\ y-axis$)

Applications:

Ex: Consider the two functions f defined by its curve C_f $g(x) = f(|x|)$, deduce the graph of g using C_f.

Soln:





Therefore, we can say that

$$g(x) = \begin{cases} f(x) & for\ \ x \geq 0 \\ f(-x) & for\ \ x \leq 0 \end{cases}$$

Comparing graphs of f & g we say:

i) C_f & C_g are ***confounded*** for all $x \geq 0$

ii) C_f & C_g are ***symmetric*** with respect to $y-axis$ for all $x \leq 0$

Notice that: $g(x) = f(|x|)$ ***is an even function.***

On your own:

Consider the function $r: x \mapsto \sqrt{x-2}$

1- Determine domain and parity of r.

………………………………………………………………..

………………………………………………………………..

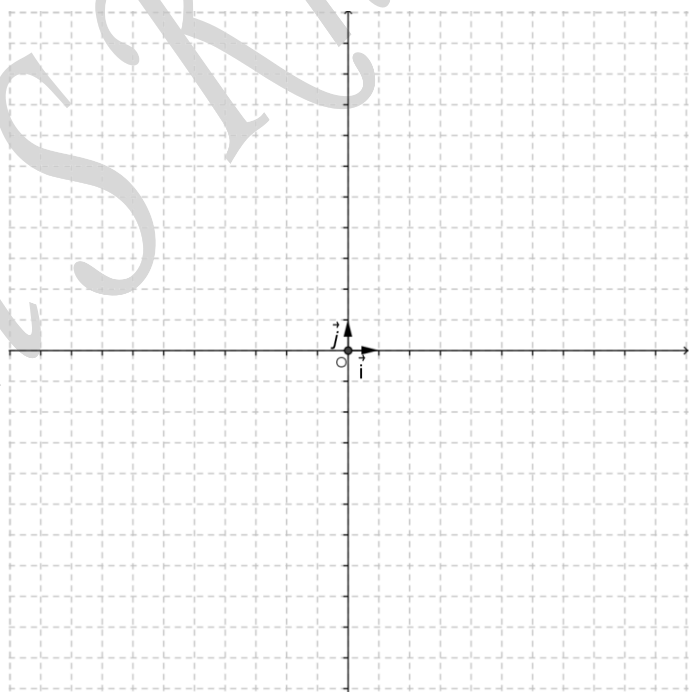
………………………………………………………………..

………………………………………………………………..

………………………………………………………………..

2- Set up the table of variation of r over its domain.

x	
$r(x)$	



3- Graph on the orthonormal system $(O,\vec{i},\vec{j})$ the curve of r.

4- On the same system $(O,\vec{i},\vec{j})$ ***deduce*** the graph of a function $n(x) = r(|x|)$.

5- Write $n(x)$ in terms of $r(x)$.

$$n(x) = \begin{cases} \quad\quad\quad\quad \text{for all } x \\ \\ \quad\quad\quad\quad \text{for all } x \end{cases}$$

6- Deduce domain, and set up the table of variation of n

x	
$n(x)$	

7- Compare graphs of r & n.

………………………………………………………………..

………………………………………………………………..

………………………………………………………………..

………………………………………………………………..