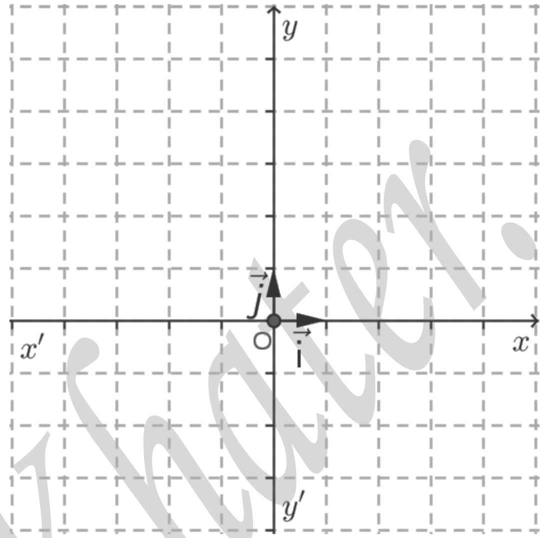
Application:



Consider the function $f : f(x) = 2x - 1$.

1. Find the domain of definition of $f(x)$.

Since, f ……………… D_f = ...

2. Study the parity of f in its domain

……………………………………………………

……………………………………………………

3. Study the variation of f on D_f

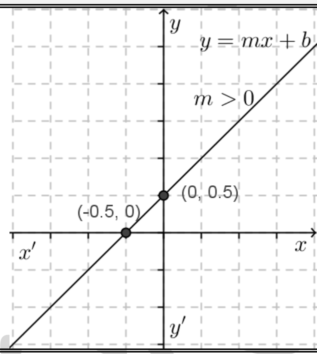
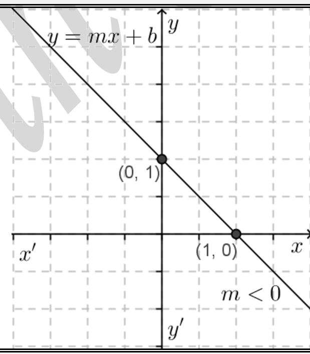
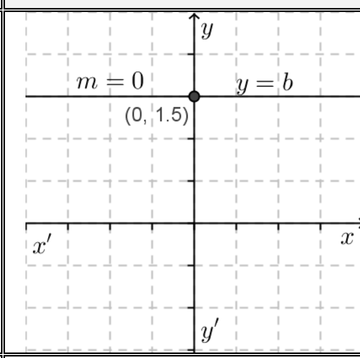
……………………………………………………

4. Complete the following table:

x	-∞	-1	0	1	+∞
$f(x)$					

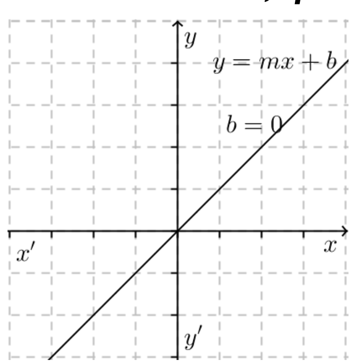
5. Plot the points $(x; f(x))$ & sketch the graph of f .

A. <u>*Affine functions*</u>: ***A function f is said to be affine, if it is of the form $f(x) = mx + b$.and it is:***

Variation	*Strictly increasing*	*Strictly decreasing*	*Horizontal*
Graphical representation			
Slant	m is …….	m is …….	m is …….
Parity	An affine function is: ……………………..		Always even

B. <u>*Linear functions*</u>: ***A function f is said to be linear, if it is of the form $f(x) = mx$ that is $b = 0$.***

The parity of a linear function is always ……



Thus, it is element of *symmetry is the* ………

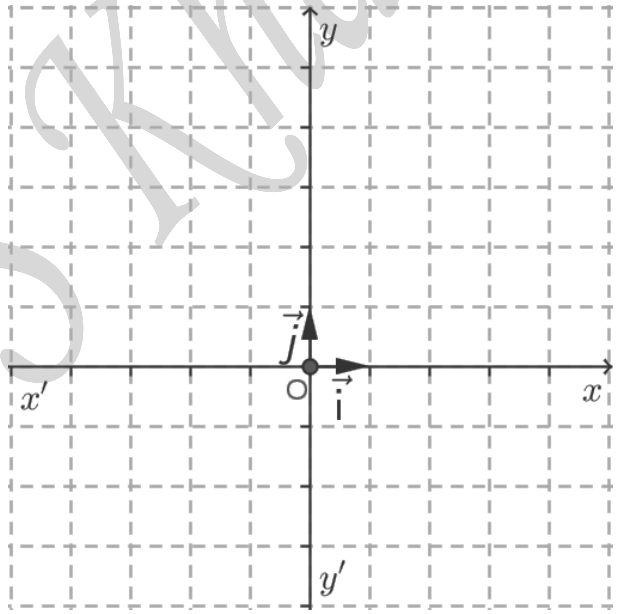
C. ***Piece-wise function*:** A function defined by two (or more) equations over a specified domain is called a piecewise function.

That is a function f is said to be piece-wised, if it is expressed in the form:

$$f(x)=\begin{cases} ax+b & \text{if } x\le k \\ cons. & \text{if } k<x<k_1 \\ cx+d & \text{if } x\ge k_1 \end{cases}$$

Application:

Consider the function g defined by: $g(x)=\begin{cases} -2x-1 & \text{if } x\le -2 \\ 3 & \text{if } -2<x<2 \\ x+1 & \text{if } x\ge 2. \end{cases}$



1) Find the domain of definition of $g(x)$.

$D_g=$ . . . .

2) Study the parity of g on ***every part*** of its domain

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3) Study the variation of g on every part of D_g

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....

4) Complete the following table:

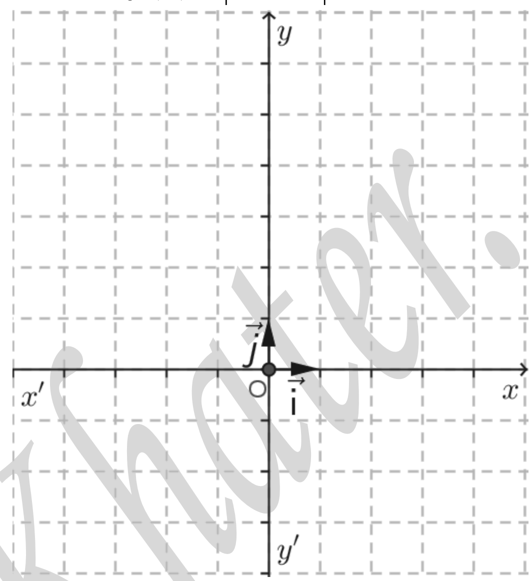
x	-4	-3	-2	0	1	2	3
$g(x)$							

5) Plot the points $(x;g(x))$ & sketch the graph of g .

D. Absolute value function:

A function f is said to be in absolute form, if it is expressed as: $f(x)=|ax+b|$.

Consider the function s defined by:



$$s(x)=|x|=\begin{cases} x & if\ x>0 \\ 0 & if\ x=0 \\ -x & if\ x<0. \end{cases}$$

1- Which values of x admit images over s? Explain.

. . . .

2- Complete the following table:

x	-3	-2	-1	0	1	2	3
$s(x)$							

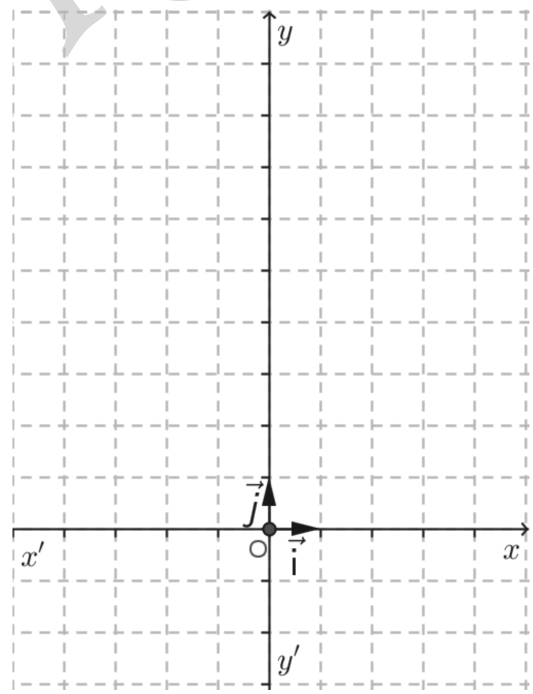
3- Plot the points $(x;s(x))$ & sketch the graph of s

E. Square valued function:

A function f is said to be square, if it is expressed as: $f(x)=ax^2+bx+c$.

Consider the squared function t defined by:

$p(x)=x^2$ (***Parabola***)



1- Find the interval for which there exists C_p.

. . . .

2- Study the parity of p over its domain.

....

....

3- Study the variation of p over its domain.

....

....

4- Complete the following table:

x	$-\infty$	-2	-1	0	1	2	$+\infty$
$p(x)$							

5- Plot the points $(x;p(x))$ & sketch the graph of p.

To graph the function $f:\ y=ax^2,\ for\ all\ a\neq 0$ we should notice the following properties:

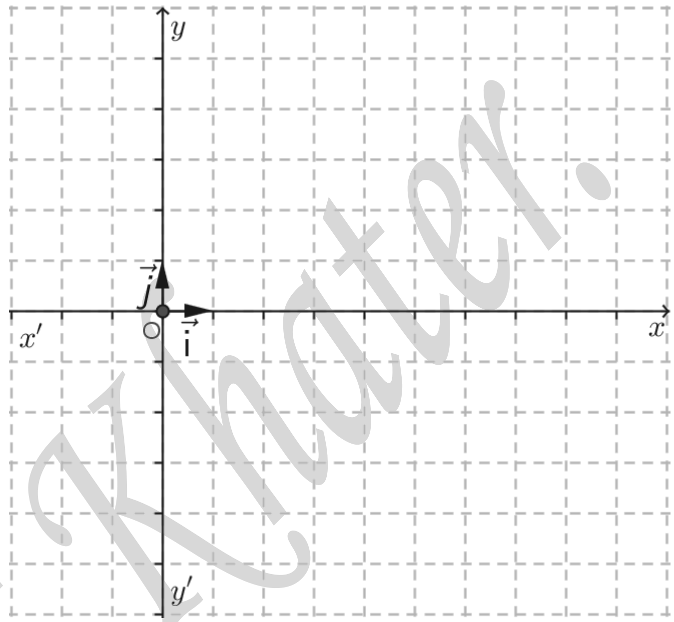
1) The ***vertex*** of C_f is $V(0;0)$, since it is of the form $(x-0)^2+0$
2) f is symmetric about the $y-axis$, since $for\ all\ x\in D_f,\ f(x)=f(-x)(i.e\ \ even\ \ function)$
3) If $a>0$, then the parabola ***opens upwards*** and V in this case is the ***minimum*** point on C_f.
4) If $a<0$, then the parabola ***opens downwards*** and V in this case is the ***maximum*** point on C_f.

F. *Square root function*:

A square root function f is a function expressed in the form: $f(x)=\sqrt{ax^2+bx+c}$.

Consider the function r defined by:

$$r(x)=\sqrt{x}$$



1- Find the domain of definition of $t(x)$.

$D_r =$ . . . .

2- Study the parity of r over its domain.

…………………………………………………

…………………………………………………

3- Study the variation of r over its domain.

…………………………………………………

…………………………………………………

4- Complete the following table:

x	0	1	4	9	$+\infty$
$r(x)$					

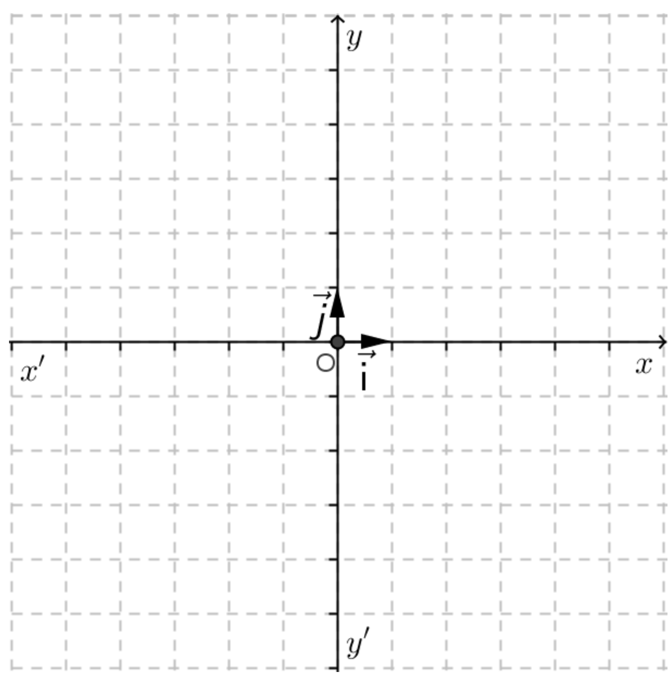
5- Plot the points $(x;r(x))$ & sketch the graph of r.

G. *Rational function*:

A function f is said to be a rational function, if it is expressed in the form: $f(x)=\dfrac{p(x)}{g(x)}=\dfrac{ax+b}{cx+d}$

Consider the function f defined by:

$$h(x)=\frac{1}{x}$$ ***(Hyperbola)***



1- Find the domain of definition of $q(x)$.

$D_h =$ . . . .

2- Does C_h admits symmetry? Explain analytically.

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…………………………………………………

…………………………………………………

3- Study the variation of h over its domain.

…………………………………………………

…………………………………………………

4- Complete the following table:

x	$-\infty$	-4	-2	-1	0	1	2	4	$+\infty$
$h(x)$									

5- Plot the points $(x;h(x))$ & sketch the graph of h.