Studybeesofficial

Where Minds Pollinate

Class 12
Mathematics

Chapter 1

Exercise 1.2

Handwritten Solution

Exercise 1.2

Q1 Plot the graph of the functions

(i) $f(x) = 3x - 2$

let $y = f(x)$

$y = 3x - 2$ — eq(i) (linear function) bcs power on x is 1

input →	x	-2	-1	0	1	2	3
output →	y	-8	-5	-2	1	4	7

Putting -2 in eq(i),

$y = 3x - 2$
$y = 3(-2) - 2$
$y = -6 - 2$
$y = -8$

Putting -1 in eq(i),

$y = 3x - 2$
$y = 3(-1) - 2$
$y = -3 - 2$
$y = -5$

Putting 0 in eq(i),

$y = 3x - 2$
$y = 3(0) - 2$
$y = 0 - 2$
$y = -2$

Putting 1 in eq(i),

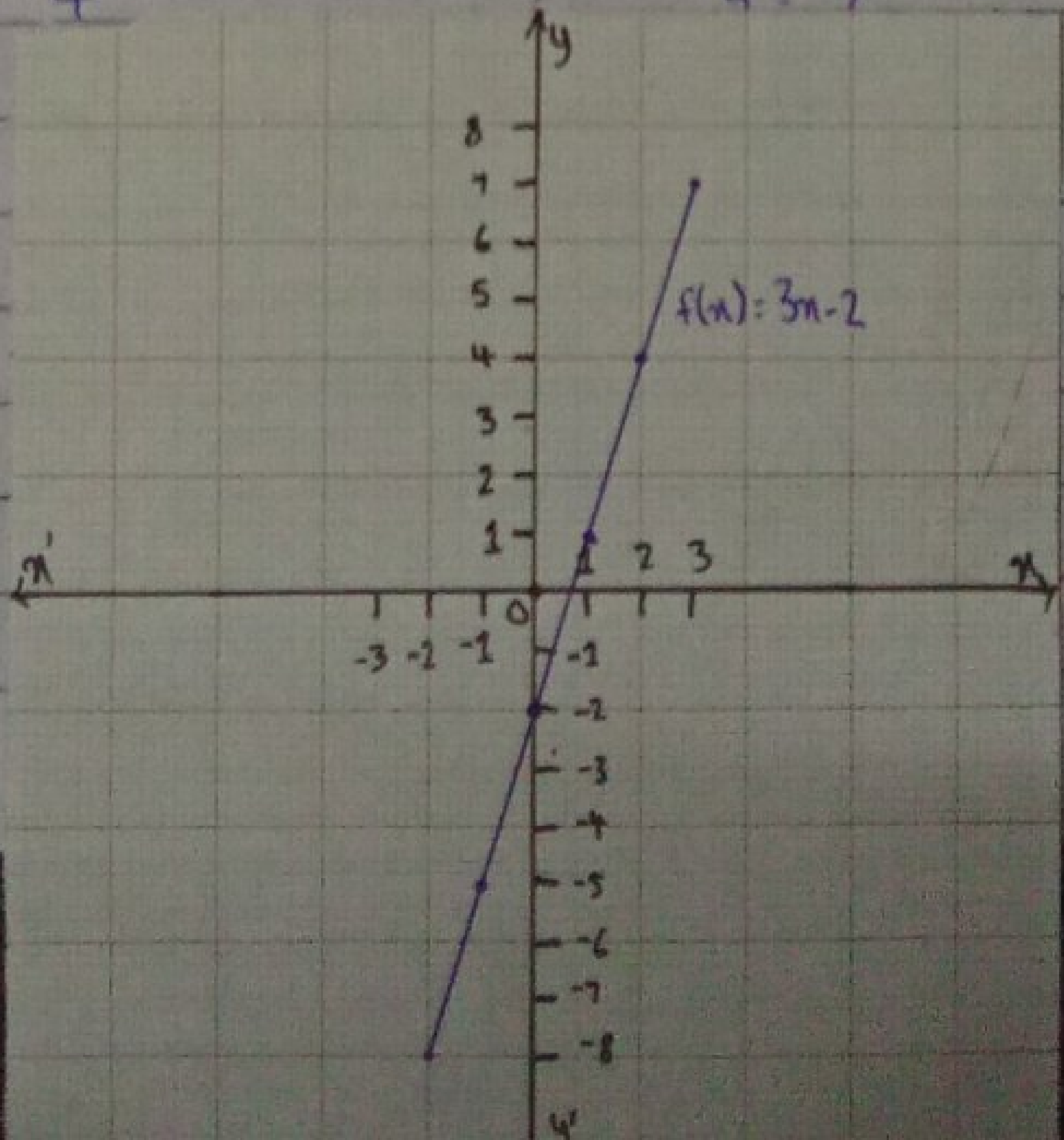
$y = 3x - 2$
$y = 3(1) - 2$
$y = 3 - 2$
$y = 1$

Putting 2 in eq(i),

$y = 3x - 2$
$y = 3(2) - 2$
$y = 6 - 2$
$y = 4$

Putting 3 in eq(i),

$y = 3x - 2$
$y = 3(3) - 2$
$y = 9 - 2$
$y = 7$



(ii) $f(x) = 3x$

let $y = f(x)$

$y = 3x$ → eq(i) (linear function)

x	-2	-1	0	1	2
y	-6	3	0	3	6

Putting -2 in eq(i),

$y = 3x$

$y = 3(-2)$

$y = -6$

Putting -1 in eq(i),

$y = 3x$

$y = 3(-1)$

$y = -3$

Putting 0 in eq(i),

$y = 3x$

$y = 3(0)$

$y = 0$

Putting 1 eq(i),

$y = 3x$

$y = 3(1)$

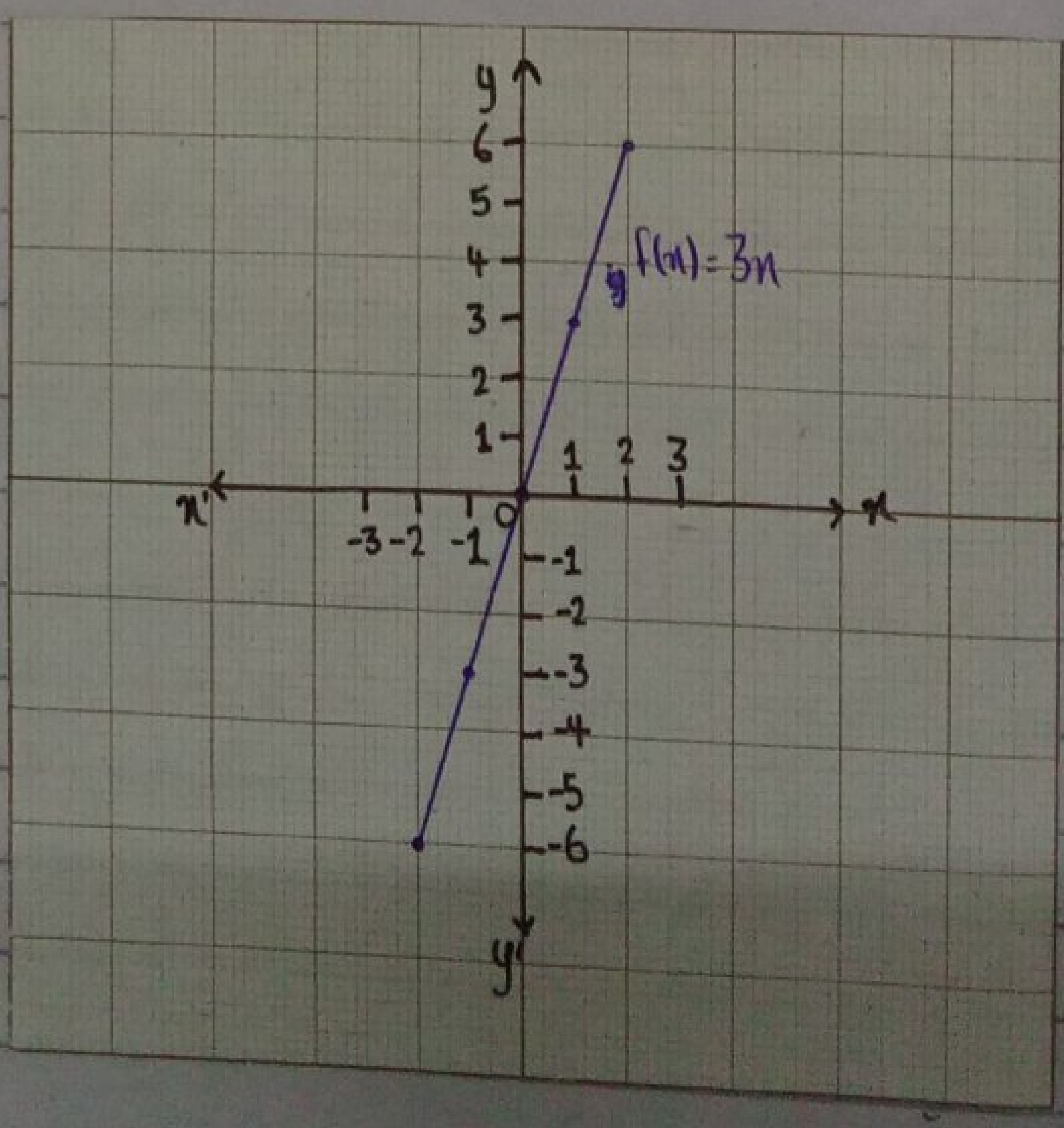
$y = 3$

Putting 2 in eq(i),

$y = 3x$

$y = 3(2)$

$y = 6$



(iii) $f(x) = 1-2x$

let $y = f(x)$

$y = 1-2x$ ... eq(i) (linear function)

x	-3	-2	-1	0	1	2	3
y	7	5	3	1	-1	-3	-5

Putting -3 in eq(i),

$y = 1-2x$
$y = 1-2(-3)$
$y = 1+6$
$y = 7$

Putting -2 in eq(i),

$y = 1-2x$
$y = 1-2(-2)$
$y = 1+4$
$y = 5$

Putting -1 in eq(i),

$y = 1-2x$
$y = 1-2(-1)$
$y = 1+2$
$y = 3$

Putting 0 in eq(i),

$y = 1-2x$
$y = 1-2(0)$
$y = 1-0$
$y = 1$

Putting 1 in eq(i),

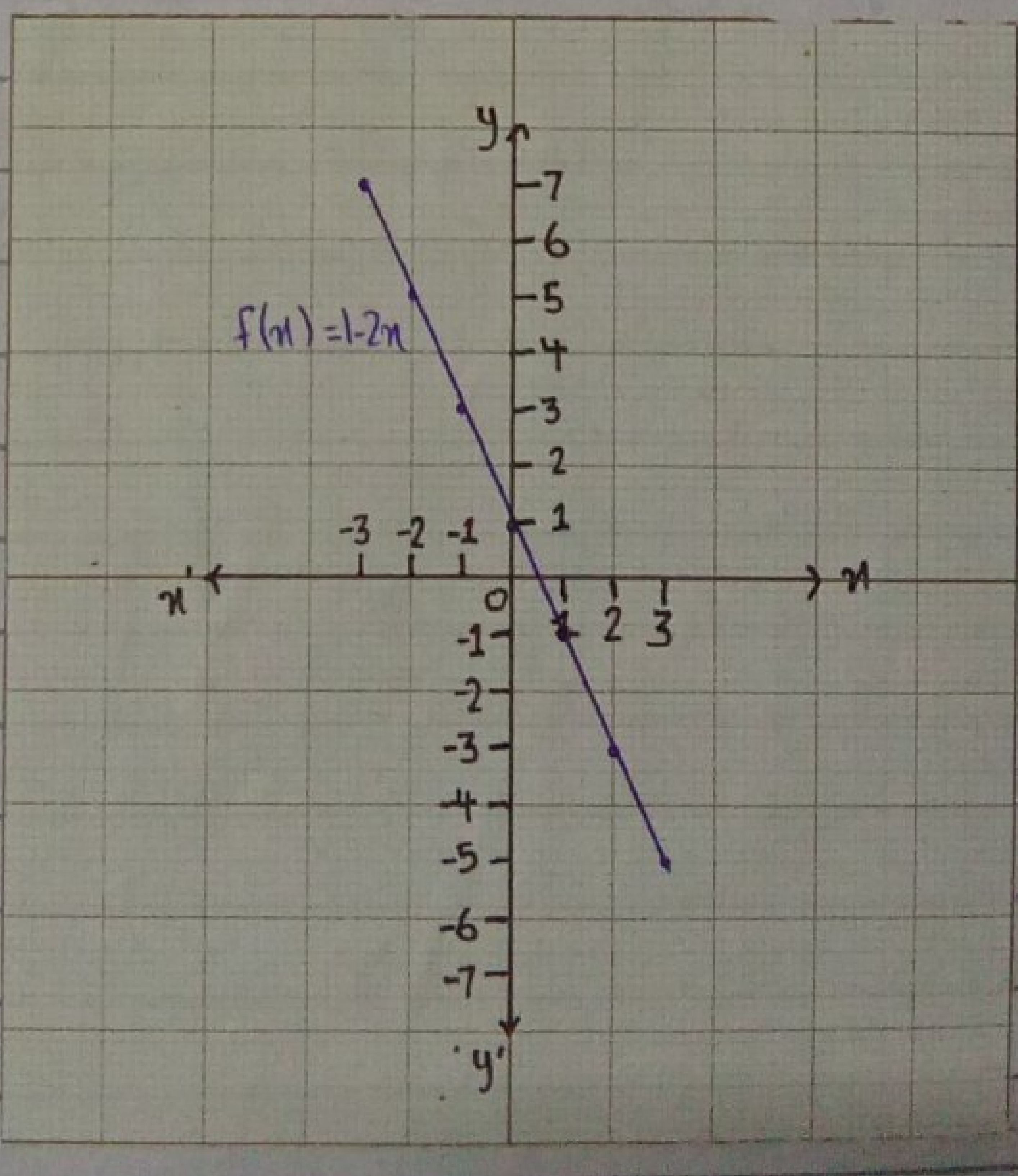
$y = 1-2x$
$y = 1-2(1)$
$y = 1-2$
$y = -1$

Putting 2 in eq(i),

$y = 1-2x$
$y = 1-2(2)$
$y = 1-4$
$y = -3$

Putting 3 in eq(i),

$y = 1-2x$
$y = 1-2(3)$
$y = 1-6$
$y = -5$



(v) $g(x) = x^2+4$

(a)

let, $y = g(x)$

$y = x^2+4$ —eq(i)

(Quadratic Function)

As,

$y = ax^2+bx+c$

So,

(i) $a > 0$ so its an open upward

(ii) $b = 0$ so it is at y-axis

(iii) $c = 4$ so $(0,4)$ intercept

(iv) $x = \frac{-b}{2a} \Rightarrow x = \frac{-0}{2(1)} \Rightarrow \boxed{x = 0}$ is the equation at y=axis

x	-2	-1	0	1	2
y	8	5	4	5	8

Putting -2 in eq(i),

$y = x^2+4$

$y = (-2)^2+4$

$y = 4+4$

$y = 8$

Putting -1 in eq(i),

$y = x^2+4$

$y = (-1)^2+4$

$y = 1+4$

$y = 5$

Putting 0 in eq(i)

$y = x^2+4$

$y = (0)^2+4$

$y = 0+4$

$y = 4$

Putting 1 in eq(i)

$y = x^2+4$

$y = (1)^2+4$

$y = 1+4$

$y = 5$.

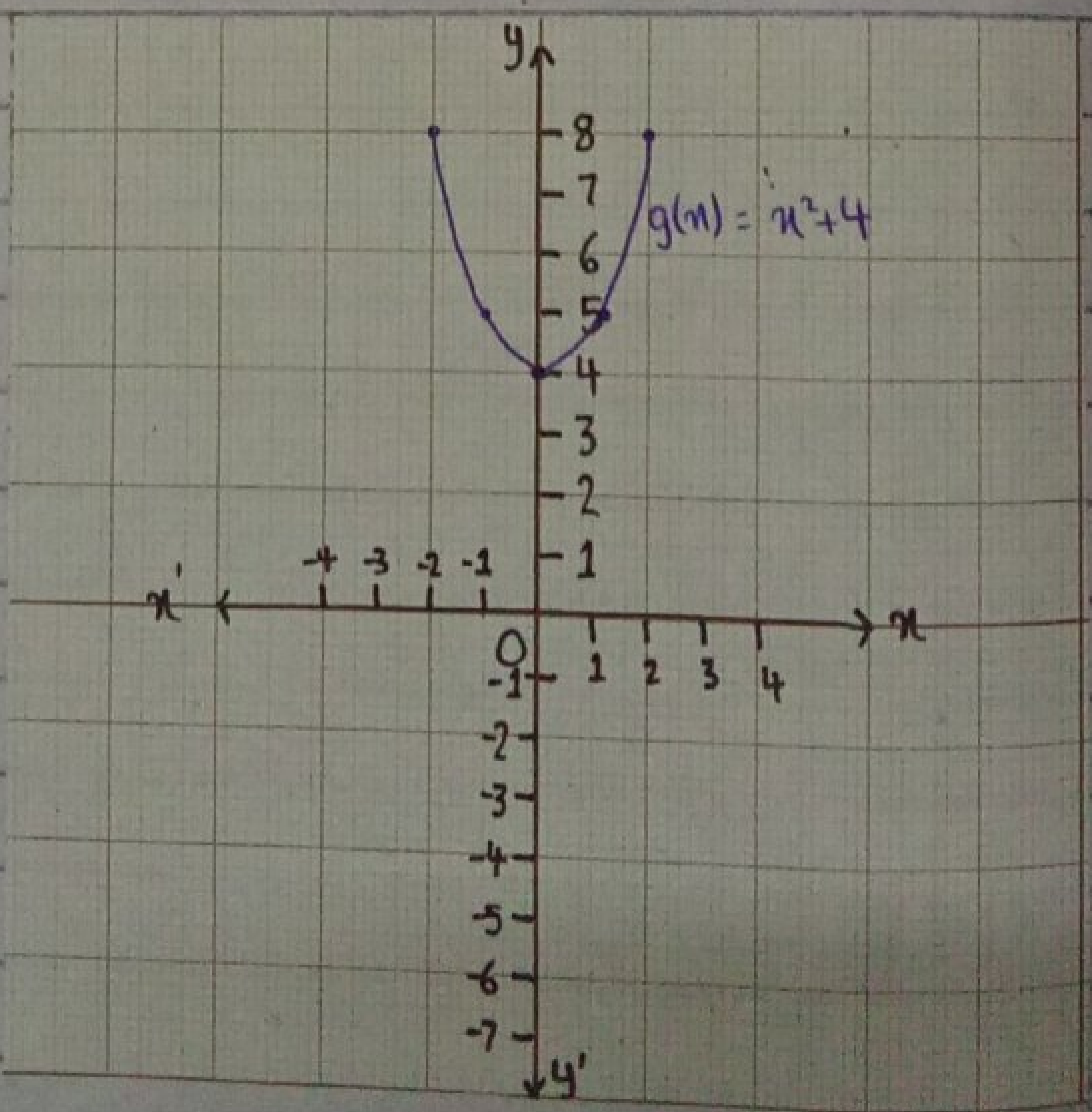
Putting 2 in eq(i)

$y = x^2+4$

$y = (2)^2+4$

$y = 4+4$

$y = 8$



(v) $g(x) = x^2 - x - 6$

let, $y = g(x)$

$y = x^2 - x - 6$ — eq(i) (Quadratic function)

As, $y = ax^2 - bx - c$

So,

(i) $a > 0$ so its an open upward

(ii) $b < 0$ so its position vertex will be horizontal right.

(iii) $C = -6$ so $(0, -6)$ intercept

(iv) $x = \frac{-b}{2a} \Rightarrow x = \frac{-(-1)}{2(1)} \Rightarrow x = \frac{1}{2} \Rightarrow \boxed{x = 0.5}$

Putting the value of x in eq(i),

$y = (0.5)^2 - (0.5) - 6$

$y = 0.25 - 0.5 - 6$

$y = -0.25 - 6$

$\boxed{y = -6.25}$

So, $(0.5, -6.25)$

Finding the x-intercept:

Since its x-intercept, $y = 0$ so putting in eq(i),

$y = x^2 - x - 6$

$0 = x^2 - x - 6$

$0 = x^2 - 3x + 2x - 6$

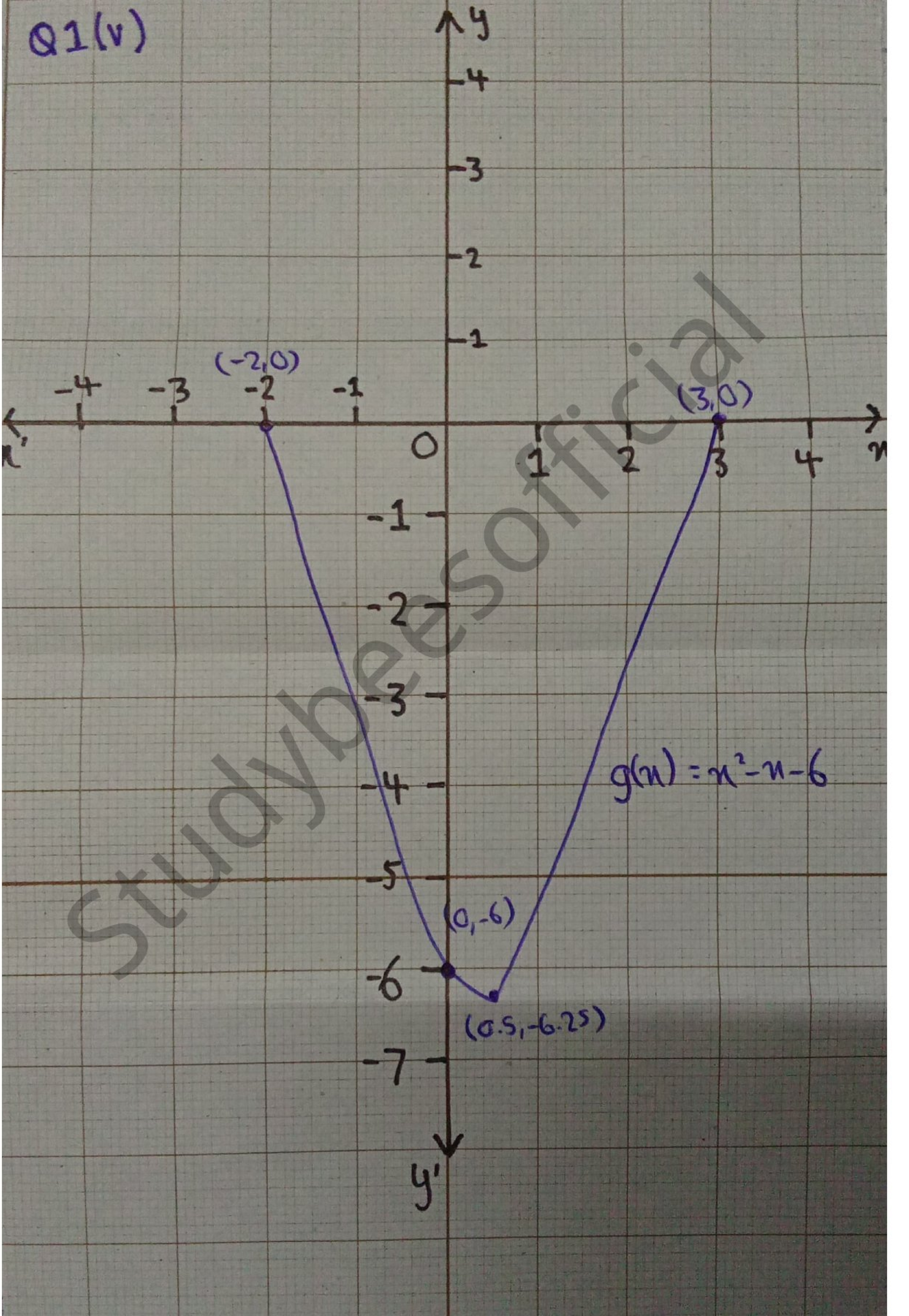
$0 = x(x-3) + 2(x-3)$

$0 = (x-3)(x+2)$

$x - 3 = 0$	$x + 2 = 0$
$x = 3$	$x = -2$
So, $(3, 0)$	$(-2, 0)$

Plotting the points $(0, -6)$, $(0.5, -6.25)$, $(3, 0)$, $(-2, 0)$

Q1(v)



(vi) $g(x) = \sqrt{2x+1}$

let, $y = g(x)$

$y = \sqrt{2x+1}$ —eq(i) (neither linear nor quadratic function)

$2x+1 \geq 0$

$2x \geq -1$

$x \geq \frac{-1}{2}$

x	-0.5	0	0.5	1	1.5	2
y	0	1	1.4	1.7	2	2.2

Putting -0.5 in eq(i),

$y = \sqrt{2x+1}$

$y = \sqrt{2(-0.5)+1}$

$y = \sqrt{-1+1}$

$y = \sqrt{0}$

$y = 0$

Putting 0 in eq(i),

$y = \sqrt{2x+1}$

$y = \sqrt{2(0)+1}$

$y = \sqrt{0+1}$

$y = \sqrt{1}$

$y = 1$

Putting 0.5 in eq(i),

$y = \sqrt{2x+1}$

$y = \sqrt{2(0.5)+1}$

$y = \sqrt{1+1}$

$y = \sqrt{2}$

$y = 1.4$

Putting 1 in eq(i),

$y = \sqrt{2x+1}$

$y = \sqrt{2(1)+1}$

$y = \sqrt{2+1}$

$y = \sqrt{3}$

$y = 1.7$

Putting 1.5 in eq(i),

$y = \sqrt{2x+1}$

$y = \sqrt{2(1.5)+1}$

$y = \sqrt{3+1}$

$y = \sqrt{4}$

$y = 2$

Putting 2 in eq(i),

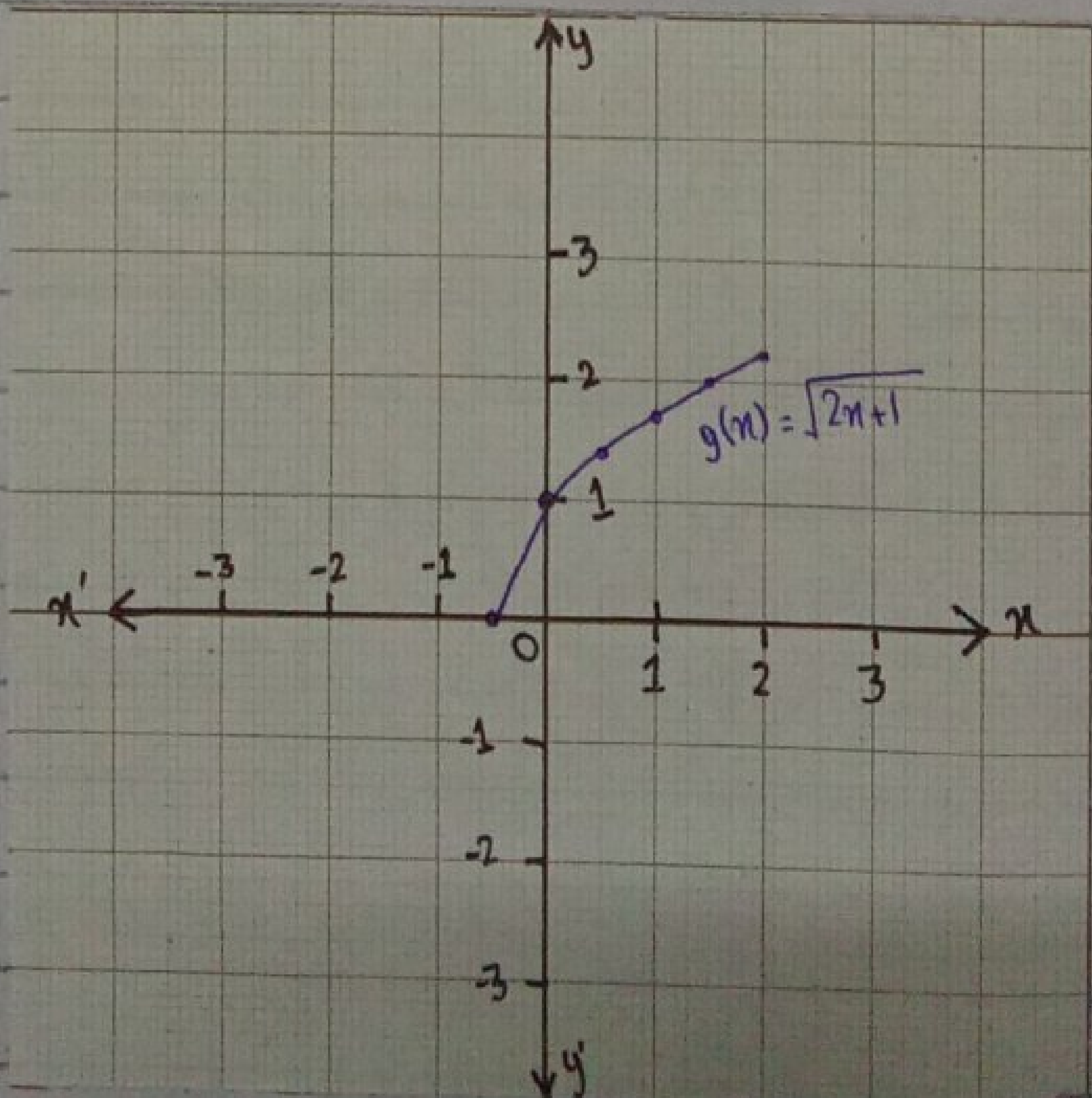
$y = \sqrt{2x+1}$

$y = \sqrt{2(2)+1}$

$y = \sqrt{4+1}$

$y = \sqrt{5}$

$y = 2.2$



Q2 Plot the graph of the following functions.

(i) $f(x) = -x^2+1$

let $y = f(x)$

$y = -x^2+1$ — eq(i) (Quadratic function)

As, $y = -ax^2+bx+c$

So,

(i) $a < 0$ so it is open downwards

(ii) $b = 0$ so the vertex is at y-axis

(iii) $c = 1$ so $(0, 1)$

(iv) $x = \frac{-b}{2a} \Rightarrow x = \frac{-0}{2(-1)} \Rightarrow x = \frac{0}{-2} \Rightarrow \boxed{x = 0}$ is the equation of Symmetry

x	-2	-1	0	1	2
y	-3	0	1	0	-3

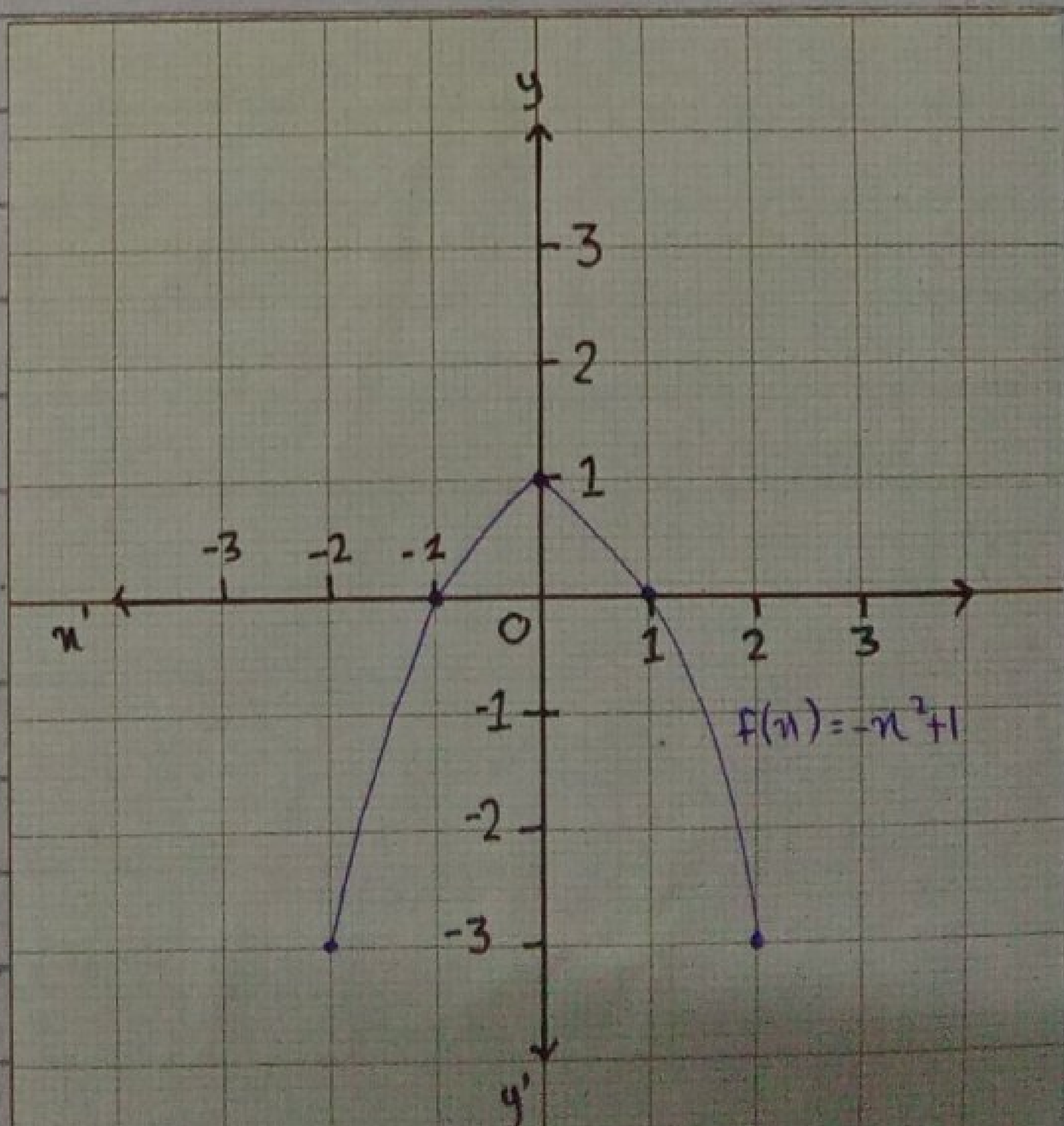
Putting -2 in eq(i),
$y = -x^2+1$
$y = -(-2)^2+1$
$y = -(4)+1$
$y = -4+1$
$y = -3$

Putting -1 in eq(i),
$y = -x^2+1$
$y = -(-1)^2+1$
$y = -(1)+1$
$y = -1+1$
$y = 0$

Putting 0 in eq(i),
$y = -x^2+1$
$y = -(0)^2+1$
$y = -0+1$
$y = \underline{1}$

Putting 1 in eq(i),
$y = -x^2+1$
$y = -(1)^2+1$
$y = -1+1$
$y = 0$

Putting 2 in eq(i),
$y = -x^2+1$
$y = -(2)^2+1$
$y = -4+1$
$y = -3$



(ii) $f(x) = 2x^3$

let, $y = f(x)$

$y = 2x^3$ ⟶ eq(i) (neither Quadratic nor linear)

x	-3	-2	-1	0	1	2	3
y	-54	-16	-2	0	2	16	54

Putting -3 in eq(i),

$y = 2x^3$

$y = 2(-3)^3$

$y = 2(-27)$

$y = -54$

Putting -2 in eq(i),

$y = 2x^3$

$y = 2(-2)^3$

$y = 2(-8)$

$y = -16$

Putting -1 in eq(i),

$y = 2x^3$

$y = 2(-1)^3$

$y = 2(-1)$

$y = -2$

Putting 0 in eq(i),

$y = 2x^3$

$y = 2(0)^3$

$y = 2(0)$

$y = 0$

Putting 1 in eq(i),

$y = 2x^3$

$y = 2(1)^3$

$y = 2(1)$

$y = 2$

Putting 2 in eq(i),

$y = 2x^3$

$y = 2(2)^3$

$y = 2(8)$

$y = 16$

Putting 3 in eq(i),

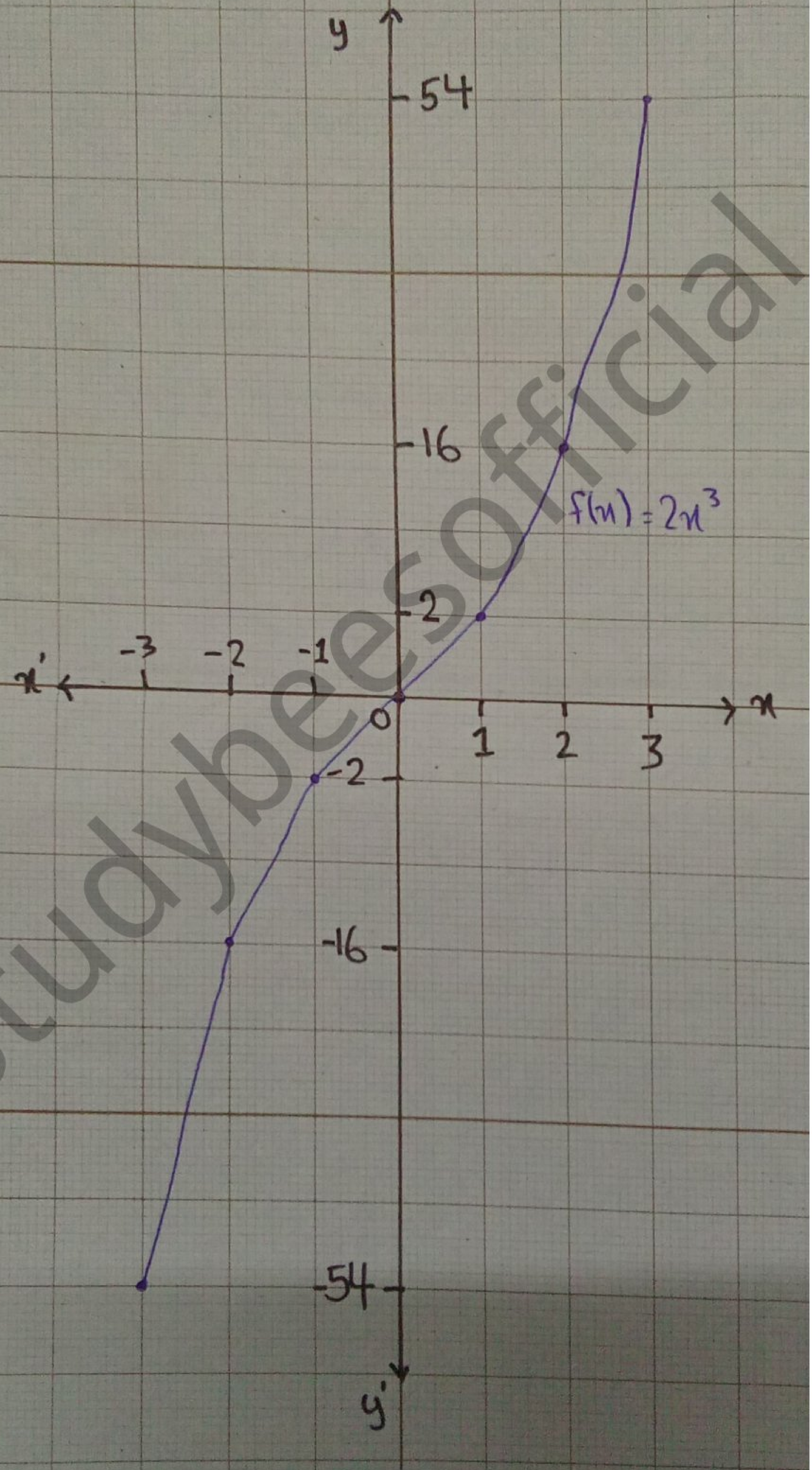
$y = 2x^3$

$y = 2(3)^3$

$y = 2(27)$

$y = 54$

Q2(ii)



(iii) $f(x) = 1 + x^{-2}$

$1 + \frac{1}{x^2}$ So Domain
$1 + \frac{1}{0^2}$ D: R-{0
$1 + \infty$

let, $y = f(x)$

$y = 1 + x^{-2}$ —eq(i) (neither Quadratic nor linear)

x	-3	-2	-1	1	2	3
y	1.1	1.2	2	2	1.2	1.1

Putting the value -3 in eq(i),

$y = 1 + x^{-2}$

$y = 1 + \frac{1}{x^2}$

$y = 1 + \frac{1}{(-3)^2}$

$y = 1 + \frac{1}{9}$

$y = 1.1$

Putting the value -2 in eq(i),

$y = 1 + x^{-2}$

$y = 1 + \frac{1}{x^2}$

$y = 1 + \frac{1}{(-2)^2}$

$y = 1 + \frac{1}{4}$

$y = 1.2$

Putting the value -1 in eq(i)

$y = 1 + x^{-2}$

$y = 1 + \frac{1}{x^2}$

$y = 1 + \frac{1}{(-1)^2}$

$y = 1 + \frac{1}{1}$

$y = 1 + 1$

$y = 2$

Putting 1 in eq(i),

$y = 1 + x^{-2}$

$y = 1 + \frac{1}{x^2}$

$y = 1 + \frac{1}{(1)^2}$

$y = 1 + \frac{1}{1}$

$y = 1 + 1$

$y = 2$

Putting 2 in eq(i),

$y = 1 + x^{-2}$

$y = 1 + \frac{1}{x^2}$

$y = 1 + \frac{1}{(2)^2}$

$y = 1 + \frac{1}{4}$

$y = 1.2$

Putting 3 in eq(i),

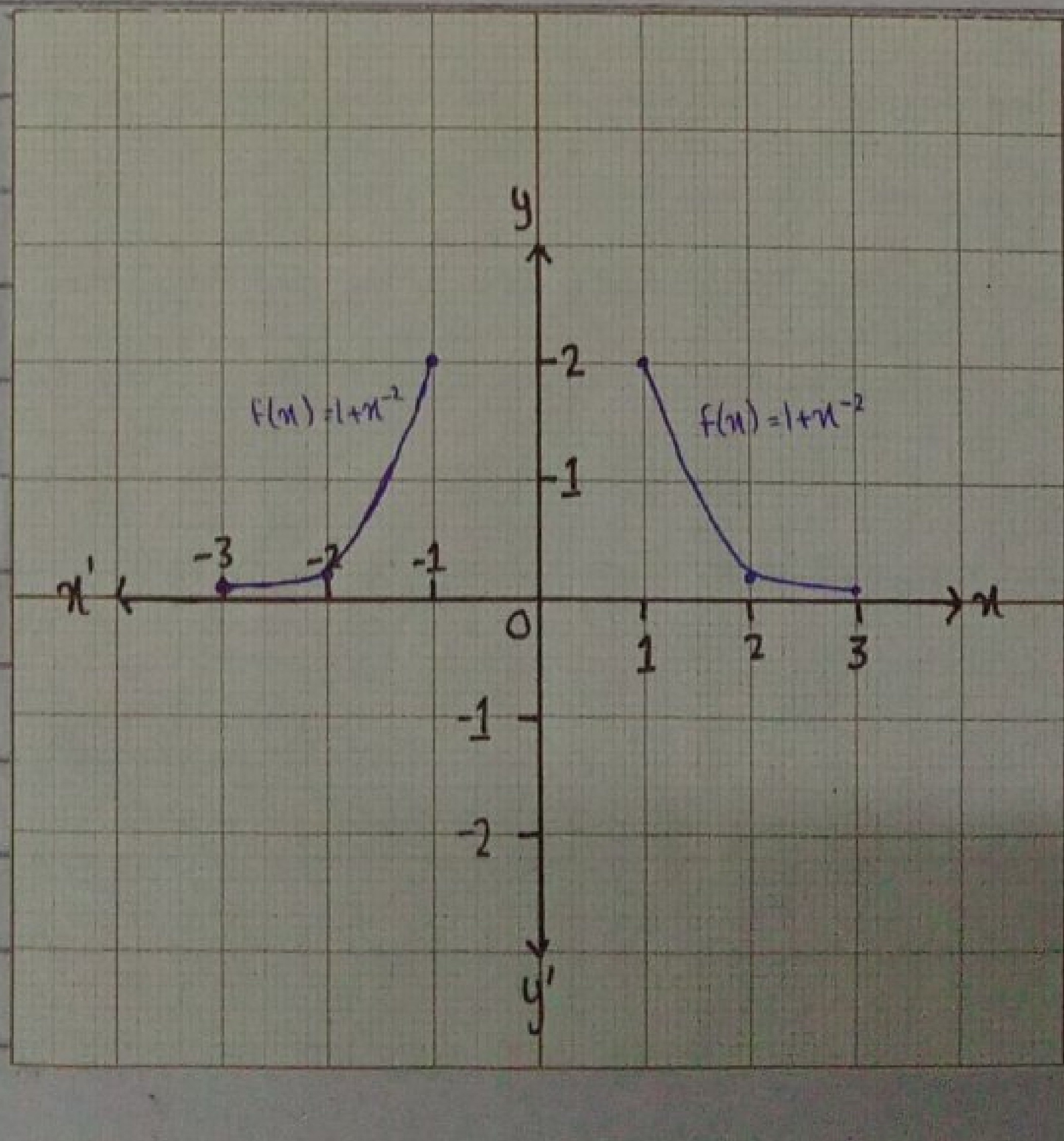
$y = 1 + x^{-2}$

$y = 1 + \frac{1}{x^2}$

$y = 1 + \frac{1}{(3)^2}$

$y = 1 + \frac{1}{9}$

$y = 1.1$



Domain = $[0, \infty)$

(iv) $f(x) = 3x^{\frac{1}{2}}$

Let, $y = f(x)$

$y = 3x^{1/2}$

$y = \sqrt{3x}$ ---- eq(i) (neither Quadratic nor linear)

x	0	1	2	3	4	5	6
y	0	1.7	2.4	3	3.4	3.8	4.2

Putting 0 in eq(i),

$y = \sqrt{3x}$

$y = \sqrt{3(0)}$

$y = \sqrt{0}$

$y = 0$

Putting 1 in eq(i),

$y = \sqrt{3x}$

$y = \sqrt{3(1)}$

$y = \sqrt{3}$

$y = 1.7$

Putting 2 in eq(i),

$y = \sqrt{3x}$

$y = \sqrt{3(2)}$

$y = \sqrt{6}$

$y = 2.4$

Putting 3 in eq(i),

$y = \sqrt{3x}$

$y = \sqrt{3(3)}$

$y = \sqrt{9}$

$y = 3$

Putting 4 in eq(i),

$y = \sqrt{3x}$

$y = \sqrt{3(4)}$

$y = \sqrt{12}$

$y = 3.4$

Putting 5 in eq(i),

$y = \sqrt{3x}$

$y = \sqrt{3(5)}$

$y = \sqrt{15}$

$y = 3.8$

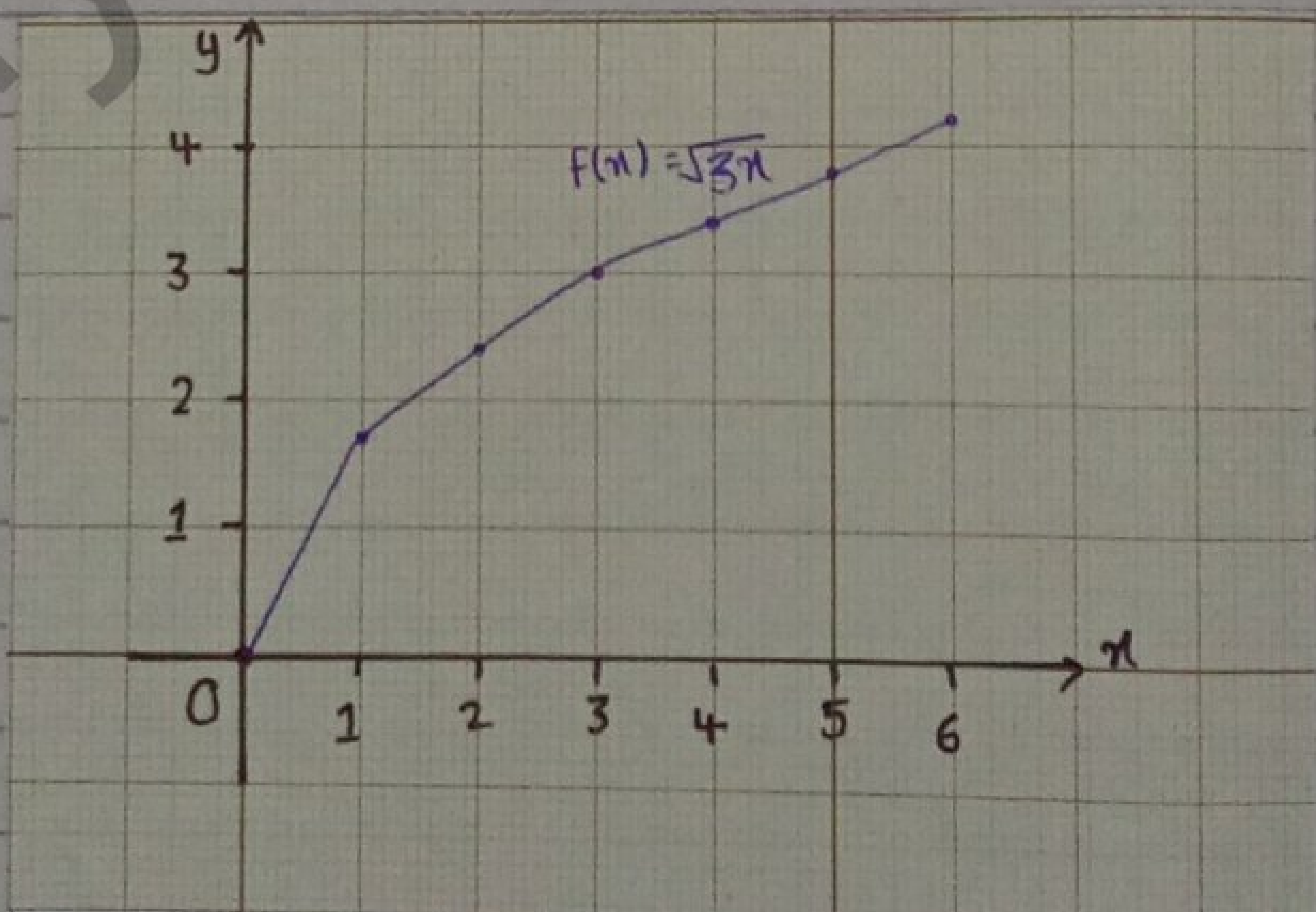
Putting 6 in eq(i),

$y = \sqrt{3x}$

$y = \sqrt{3(6)}$

$y = \sqrt{18}$

$y = 4.2$



(v) $f(x) = 2 - x^{-1/2}$

Domain: $[1, \infty)$

let, $y = f(x)$

$y = 2 - x^{-1/2}$

$y = 2 - \frac{1}{x^{1/2}}$

$y = 2 - \frac{1}{\sqrt{x}}$ —eq(i) (neither Quadratic nor linear)

x	1	2	3	4	5
y	1	1.2	1.4	1.5	1.6

Putting 1 in eq(i),

$y = 2 - \frac{1}{\sqrt{x}}$

$y = 2 - \frac{1}{\sqrt{1}}$

$y = 2 - \frac{1}{1}$

$y = 2 - 1$

$y = 1$

Putting 2 in eq(i),

$y = 2 - \frac{1}{\sqrt{x}}$

$y = 2 - \frac{1}{\sqrt{2}}$

$y = 2 - \frac{1}{1.4}$

$y = 1.2$

Putting 3 in eq(i),

$y = 2 - \frac{1}{\sqrt{x}}$

$y = 2 - \frac{1}{\sqrt{3}}$

$y = 2 - \frac{1}{1.7}$

$y = 1.4$

Putting 4 in eq(i),

$y = 2 - \frac{1}{\sqrt{x}}$

$y = 2 - \frac{1}{\sqrt{4}}$

$y = 2 - \frac{1}{2}$

$y = 1.5$

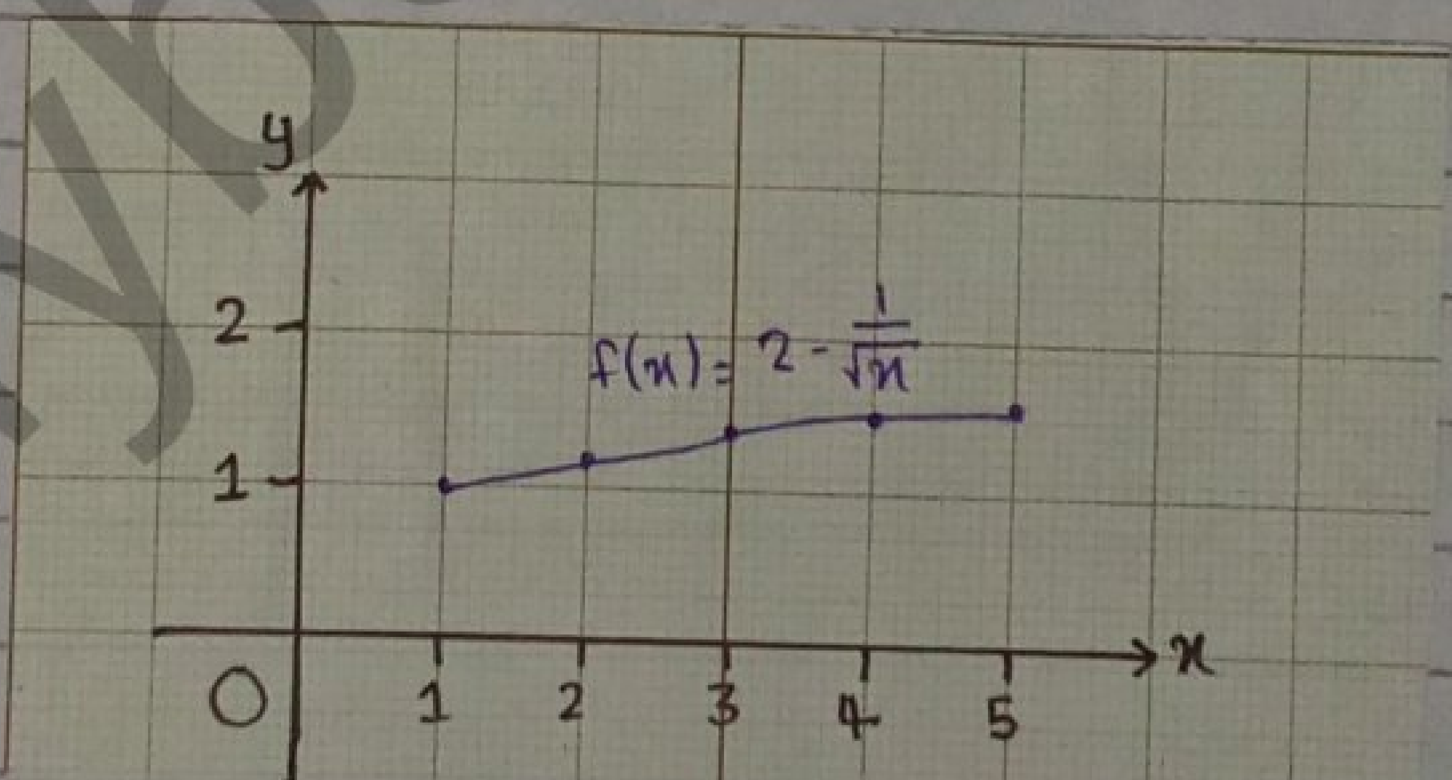
Putting 5 in eq(i),

$y = 2 - \frac{1}{\sqrt{x}}$

$y = 2 - \frac{1}{\sqrt{5}}$

$y = 2 - \frac{1}{2.23}$

$y = 1.6$



Dom = $[0, \infty)$

(vi) $f(x) = x^{5/2}$

let, $y = f(x)$

$y = x^{5/2}$ → eq(i) (neither a Quadratic nor a linear)

x	0	1	2	3	4
y	0	1	5.6	15.5	32

Putting 0 in eq(i),

$y = x^{5/2}$

$y = (0)^{5/2}$

$y = 0$

Putting 1 in eq(i),

$y = x^{5/2}$

$y = (1)^{5/2}$

$y = 1$

Putting 2 in eq(i),

$y = x^{5/2}$

$y = (2)^{5/2}$

$y = 5.6$

Putting 3 in eq(i)

$y = x^{5/2}$

$y = (3)^{5/2}$

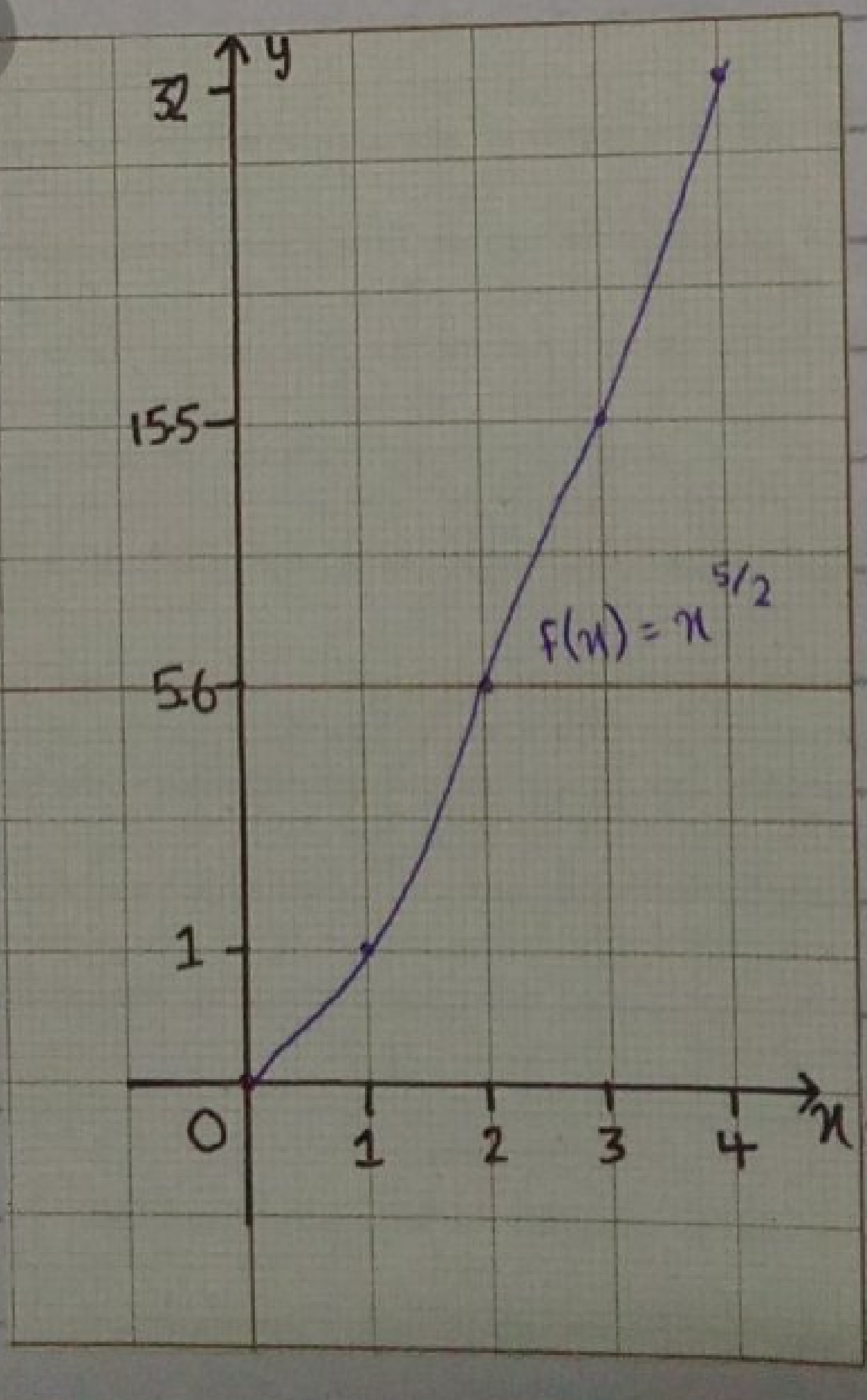
$y = 15.5$

Putting 4 in eq(i),

$y = x^{5/2}$

$y = (4)^{5/2}$

$y = 32$



Q3 Find possible x-intercept and vertex of the following functions and than plot.

(i) $f(x) = x^2+2x+1$ Dom. $\mathbb{R}-\{0\}$

let, $y = f(x)$

$y = x^2+2x+1$ — eq(i)

* Finding x-intercept:

Put $y=0$ in eq(i),

$y = x^2+2x+1$

$0 = x^2+2x+1$

$0 = x^2+x+x+1$

$0 = x(x+1)+1(x+1)$

$0 = (x+1)(x+1)$

$0 = (x+1)^2$

$\sqrt{0} = \sqrt{(x+1)^2}$

$0 = x+1$

$\boxed{x=-1}$

So, $(-1,0)$

* Finding y-intercept:

Put $x=0$ in eq(i),

$y = x^2+2x+1$

$y = (0)^2+2(0)+1$

$y = 0+0+1$

$\boxed{y=1}$

So, $(0,1)$

* Finding vertex:

$x = \dfrac{-b}{2a}$

$x = \dfrac{-2}{2(1)}$

$x = \dfrac{-2}{2}$

$\boxed{x=-1}$

Putting the value of x in eq(i) to find the value of y,

$y = x^2+2x+1$

$y = (-1)^2+2(-1)+1$

$y = 1-2+1$

$y = 2-2$

$\boxed{y=0}$

So, $(-1,0)$ is the vertex

Plotting:

(i) $a>0$ open upward

(ii) $b>0$ point of vertex is horizontally left

(iii) $c=1$ so $(0,1)$ intercept

(iv) x vertex is $(-1,0)$

x	-3	-2	-1	0	1
y	4	1	0	1	4

Putting -3 in eq(i),

$y = x^2+2x+1$

$y = (-3)^2+2(-3)+1$

$y = 9-6+1$

$y = 4$

Putting -2 in eq(i),

$y = x^2+2x+1$

$y = (-2)^2+2(-2)+1$

$y = 4-4+1$

$y = 1$

Putting (-1) in eq(i),

$y = x^2+2x+1$

$y = (-1)^2+2(-1)+1$

$y = 1-2+1$

$y = 0$

Putting 0 in eq(i),

$y = x^2+2x+1$

$y = (0)^2+2(0)+1$

$y = 0+0+1$

$y = 1$

Putting 1 in eq(i),

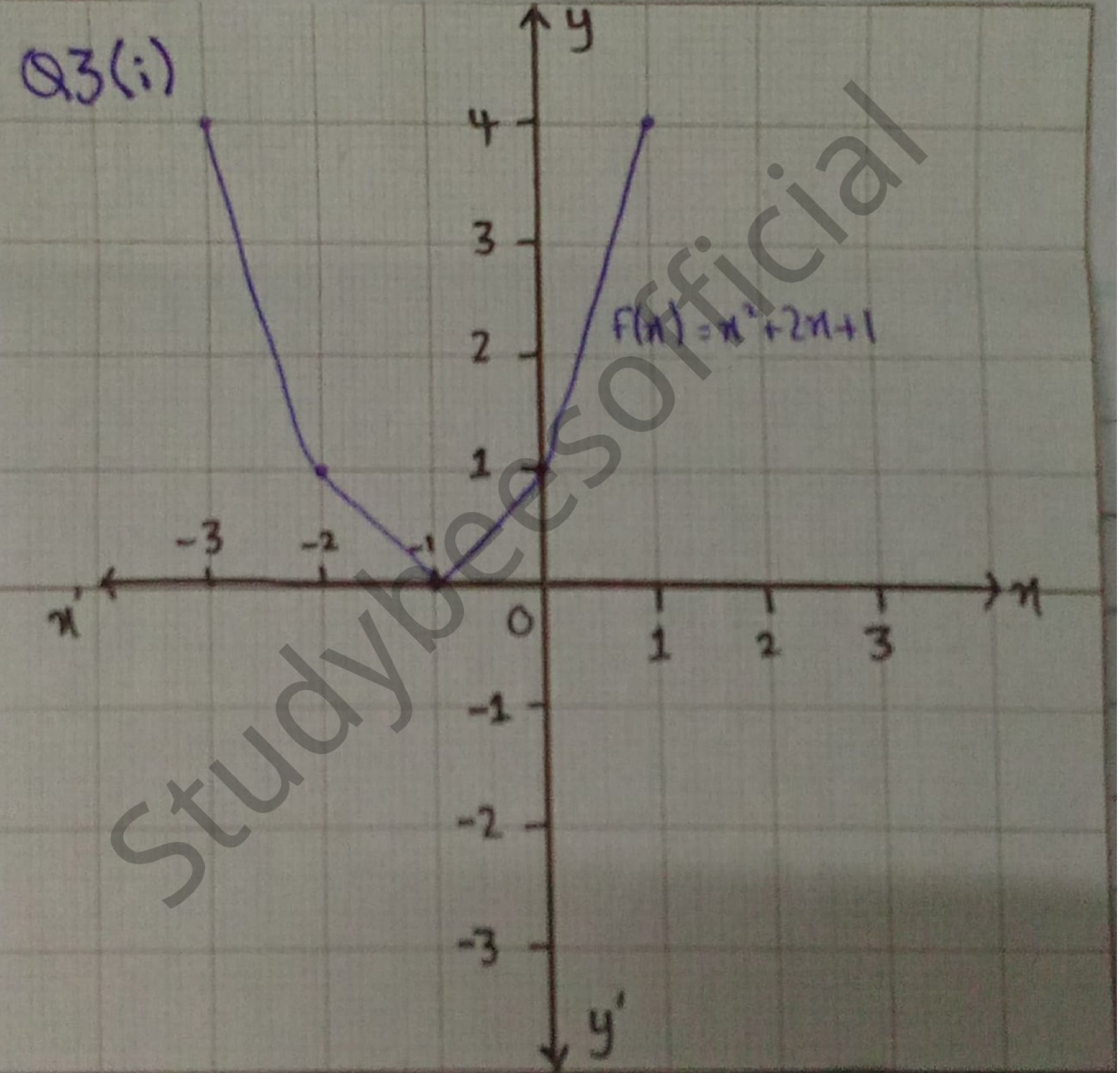
$y = x^2+2x+1$

$y = (1)^2+2(1)+1$

$y = 1+2+1$

$y = 4$

Q3(i)



Q3(ii) $f(x) = x^2 - 4x + 4$

let, $y = f(x)$

$y = x^2 - 4x + 4$ — eq (i)

★ Finding x-intercept:

put $y=0$ in eq(i),

$y = x^2 - 4x + 4$

$0 = x^2 - 4x + 4$

$x^2 - 4x + 4 = 0$

$x^2 - 2x - 2x + 4 = 0$

$x(x-2) - 2(x-2) = 0$

$(x-2)(x-2) = 0$

$(x-2)^2 = 0$

$\sqrt{(x-2)^2} = \sqrt{0}$

$x - 2 = 0$

$\boxed{x = 2}$

so $(2, 0)$

★ Finding y-intercept:

put $x=0$ in eq(i),

$y = x^2 - 4x + 4$

$y = (0)^2 - 4(0) + 4$

$y = 0 - 0 + 4$

$\boxed{y = 4}$

so $(0, 4)$

★ Finding vertex:

$x = \frac{-b}{2a}$

$x = \frac{-(-4)}{2(1)}$

$x = \frac{\cancel{4}\,2}{\cancel{2}\,1}$

$\boxed{x = 2}$

Putting the value of x in eq(i) to find y,

$y = x^2 - 4x + 4$

$y = (2)^2 - 4(2) + 4$

$y = 4 - 8 + 4$

$\boxed{y=0}$

So $(2,0)$ is the vertex

- **Plotting:**

(i) $a>0$ open upward

(ii) $b<0$ vertex is horizontally right

(iii) $c=4$ $(4,0)$ intercept

(iv) x vertex is $(2,0)$

x	0	1	2	3	4
y	4	1	0	1	4

Putting 0 in eq (i),

$y=x^2-4x+4$

$y=(0)^2-4(0)+4$

$y=0-0+4$

$y=4$

Putting 1 in eq (i),

$y=x^2-4x+4$

$y=(1)^2-4(1)+4$

$y=1-4+4$

$y=1$

Putting 2 in eq (i),

$y=x^2-4x+4$

$y=(2)^2-4(2)+4$

$y=4-8+4$

$y=0$

Putting 3 in eq (i),

$y=x^2-4x+4$

$y=(3)^2-4(3)+4$

$y=9-12+4$

$y=1$

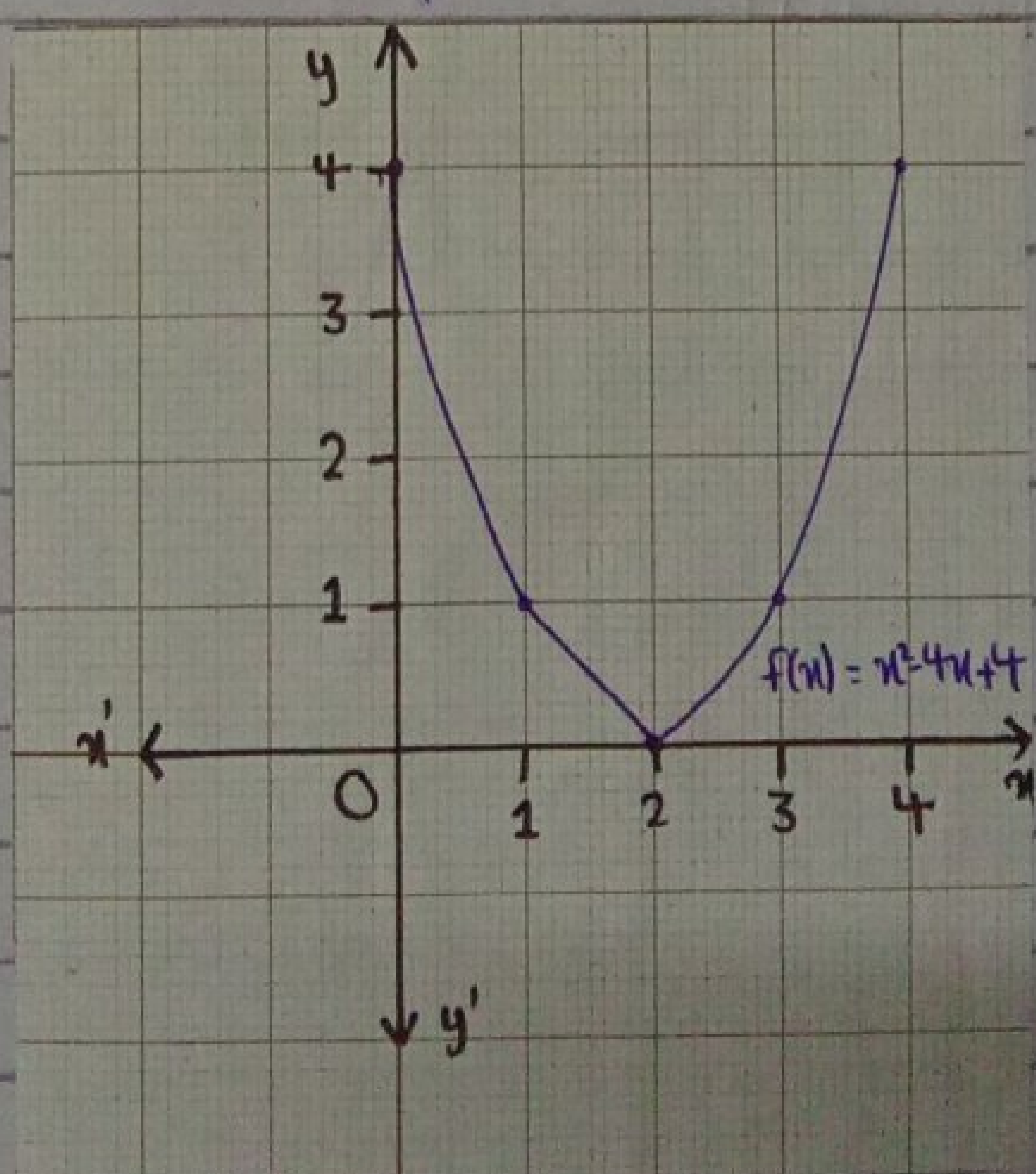
Putting 4 in eq (i),

$y=x^2-4(x)+4$

$y=(4)^2-4(4)+4$

$y=16-16+4$

$y=4$



(iii) $f(x) = x^2+2x$

let, $y = f(x)$

$y = x^2+2x$ —— eq(i)

* Finding x-intercept:

let $y=0$, in eq(i),

$y = x^2+2x$

$0 = x^2+2x$

$0 = x(x+2)$

$\boxed{x=0}$ | $x+2=0$, $\boxed{x=-2}$

so $(-2,0)$ $(0,0)$

* Finding y-intercept:

let $x=0$ in eq(i),

$y = x^2+2x$

$y = (0)^2+2(0)$

$y = 0+0$

$\boxed{y=0}$

so $(0,0)$

* Finding Vertex:

$x = \frac{-b}{2a}$

$x = \frac{-(2)}{2(1)}$

$x = \frac{-2}{2}$

$\boxed{x=-1}$

Putting the value of x in eq(i) to find the value of y,

$y = x^2+2x$

$y = (-1)^2+2(-1)$

$y = 1-2$

$\boxed{y=-1}$

$(-1,-1)$

* Plotting:

(i) $a>0$ open upward

(ii) $b>0$ point of vertex is horizontally right

(iii) $c=0$ so $(0,0)$ intercept

(iv) x vertex are $(-2,0)$ and $(0,0)$

x	-4	-3	-2	-1	0	1	2
y	8	3	0	-1	0	3	8

Putting -2 in eq(i),

$y = x^2+2x$

$y = (-2)^2+2(-2)$

$y = 4-4$

$y = 0$

Putting -1 in eq(i),

$y = x^2+2x$

$y = (-1)^2+2(-1)$

$y = 1-2$

$y = -1$

Putting 0 in eq.(i),

$y = x^2+2x$

$y = (0)^2+2(0)$

$y = 0+0$

$y = 0$

Putting 1 in eq.(i),

$y = x^2+2x$

$y = (1)^2+2(1)$

$y = 1+2$

$y = 3$

Putting -3 in eq.(i),

$y = x^2+2x$

$y = (-3)^2+2(-3)$

$y = 9-6$

$y = 3$

Putting -4 in eq.(i),

$y = x^2+2x$

$y = (-4)^2+2(-4)$

$y = 16-8$

$y = 8$

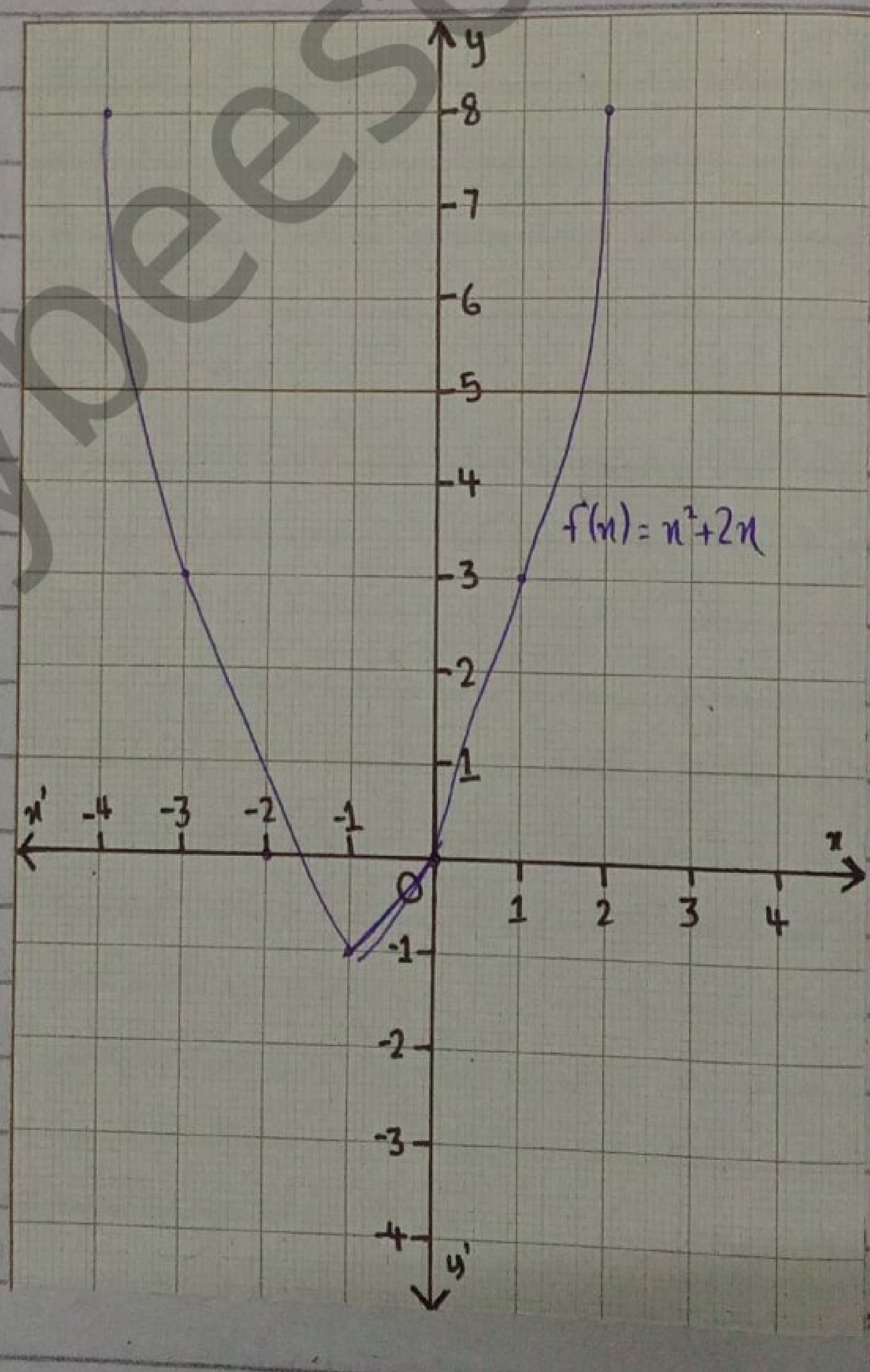
Putting 2 in eq.(i),

$y = x^2+2x$

$y = (2)^2+2(2)$

$y = 4+4$

$y = 8$



(iv) $f(x) = 9 - x^2$

let, $y = f(x)$

$y = 9 - x^2$ — eq.(i)

* Finding x-intercept:

let $y = 0$ in eq(i),

$y = 9 - x^2$

$0 = 9 - x^2$

$0 = (3)^2 - (x)^2$

$0 = (3-x)(3+x)$

$3 - x = 0$ $\quad$ $3 + x = 0$

$\boxed{x = 3}$ $\quad$ $\boxed{x = -3}$

So $(3,0)$ and $(-3,0)$

* Finding y-intercept:

let $x = 0$ in eq(i),

$y = 9 - x^2$

$y = 9 - (0)^2$

$y = 9 - 0$

$y = 9$

So $(0,9)$

* Finding Vertex:

$x = \frac{-b}{2a}$

$x = \frac{-0}{2(-1)}$

$x = \frac{-0}{-2}$

$\boxed{x = 0}$

So $(0,0)$

Putting the value of x in eq(i) to find y,

$y = 9 - x^2$

$y = 9 - (0)^2$

$y = 9 - 0$

$y = 9$

So $(0,9)$

Hence $(0,9)$

* Plotting:

(i) $a < 0$ open downward

(ii) $b = 0$ so the vertex is on y-axis

(iii) $c = 9$ $(0,9)$ intercept

(iv) x vertex are $(3,0)$ & $(-3,0)$

x	-4	-3	-2	-1	0	1	2	3	4
y	-7	0	5	8	9	8	5	0	-7

Put -4 in eq(i),

$y = 9 - x^2$

$y = 9 - (4)^2$

$y = 9 - 16$

$y = -7$

Put -3 in eq(i),

$y = 9 - x^2$

$y = 9 - (-3)^2$

$y = 9 - 9$

$y = 0$

Put -2 in eq(i)

$y = 9 - x^2$

$y = 9 - (-2)^2$

$y = 9 - 4$

$y = 5$

Put -1 in eq(i),

$y = 9 - x^2$

$y = 9 - (-1)^2$

$y = 9 - 1$

$y = 8$

Put 0 in eq(i)

$y = 9 - x^2$

$y = 9 - (0)^2$

$y = 9 - 0$

$y = 9$

Put 1 in eq(i),

$y = 9 - x^2$

$y = 9 - (1)^2$

$y = 9 - 1$

$y = 8$

Put 2 in eq(i),

$y = 9 - x^2$

$y = 9 - (2)^2$

$y = 9 - 4$

$y = 5$

Put 3 in eq(i),

$y = 9 - x^2$

$y = 9 - (3)^2$

$y = 9 - 9$

$y = 0$

Put 4 in eq(i),

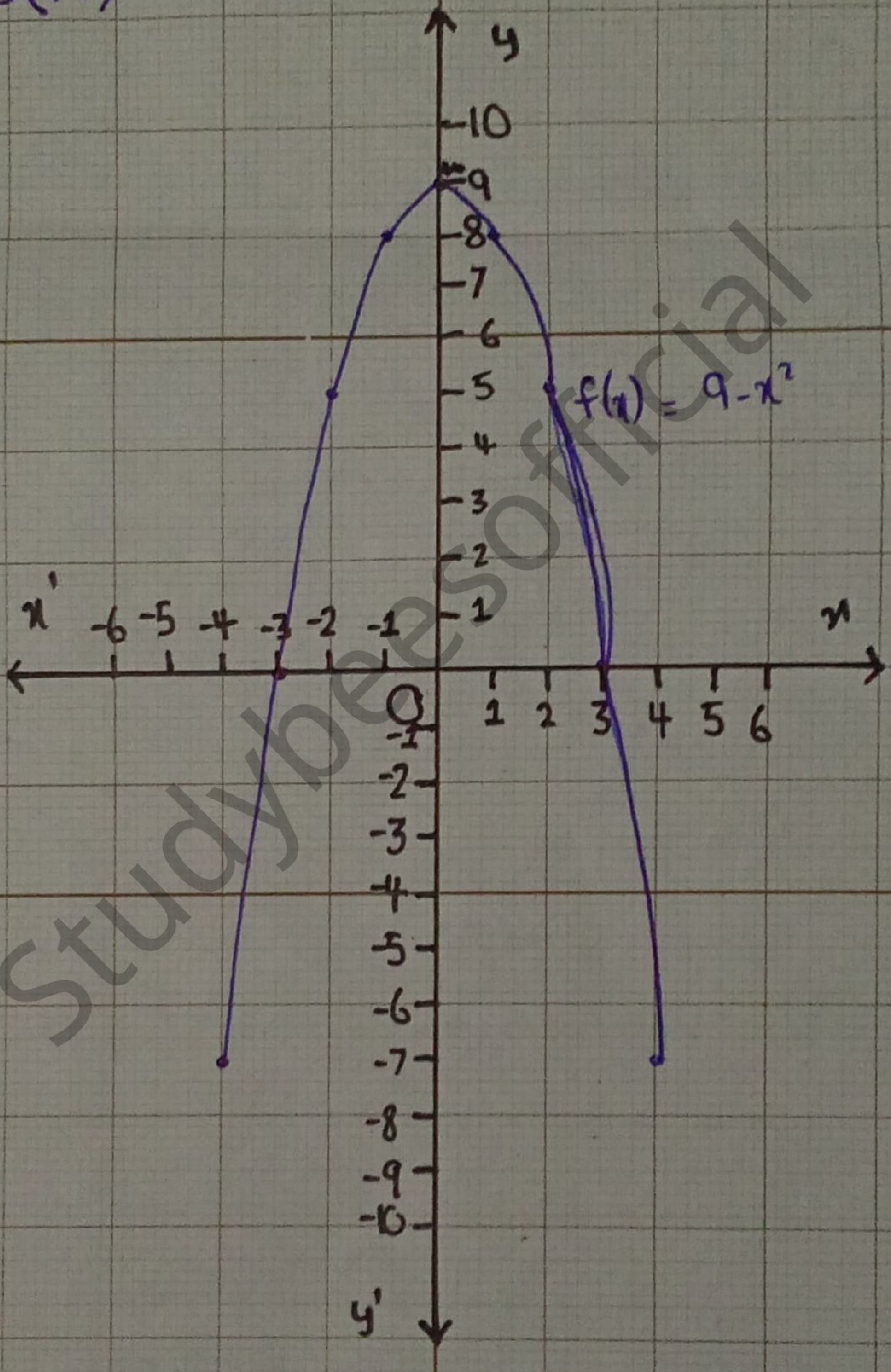
$y = 9 - x^2$

$y = 9 - (4)^2$

$y = 9 - 16$

$y = -7$

Q3(iv)



Q4 Draw the graph of following function using factors.

(i) $f(x) = x^2 - 2x + 1$

let, $y = f(x)$

$y = x^2 - 2x + 1$ — eq(i)

* Finding x-intercept:

Putting $y=0$ in eq(i),

$y = x^2 - 2x + 1$

$x^2 - 2x + 1 = 0$

Using factorization,

$x^2 - 2x + 1 = 0$

$x^2 - x - x + 1 = 0$

$x(x-1) - 1(x-1) = 0$

$(x-1)(x-1) = 0$

$x-1=0$ | $x-1=0$

$x = 1$ | $x_2 = 1$ so $(1,0)$ & $(1,0)$

* Finding y-intercept:

Put $x=0$ in eq(i),

$y = x^2 - 2x + 1$

$y = (0)^2 - 2(0) + 1$

$y = 0 - 0 + 1$

$y = 1$

so $(0,1)$

* Finding Vertex:

$x = \frac{-b}{2a}$

$x = \frac{-(-2)}{2(1)}$

$x = \frac{2}{2}$

$x = 1$

Putting the value of x in eq(i) to find the value of y,

$y = x^2 - 2x + 1$

$y = (1)^2 - 2(1) + 1$

$y = 1 - 2 + 1$

$y = -1 + 1 \Rightarrow y = 0$ so $(1,0)$

★ **Plotting:**

(i) $a > 0$ open upward

(ii) $b < 0$ point of vertex is horizontally right

(iii) $C = 1$ so $(1,0)$ intercept

(iv) x vertex are $(1,0)$

x	[illegible]	-2	-1	0	1	2	3	4
y	[illegible]	9	4	1	0	1	4	9

Putting -3 in eq(i),

$y = x^2 - 2x + 1$

$y = (-3)^2 - 2(-3) + 1$

$y = 9 + 6 + 1$

$y = 16$

Putting -2 in eq(i),

$y = x^2 - 2x + 1$

$y = (-2)^2 - 2(-2) + 1$

$y = 4 + 4 + 1$

$y = 9$

Putting -1 in eq(i),

$y = x^2 - 2x + 1$

$y = (-1)^2 - 2(-1) + 1$

$y = 1 + 2 + 1$

$y = 4$

Putting 0 in eq(i),

$y = x^2 - 2x + 1$

$y = (0)^2 - 2(0) + 1$

$y = 0 - 0 + 1$

$y = 1$

Putting 1 in eq(i),

$y = x^2 - 2x + 1$

$y = (1)^2 - 2(1) + 1$

$y = 1 - 2 + 1$

$y = -1 + 1$

$y = 0$

Putting 2 in eq(i),

$y = x^2 - 2x + 1$

$y = (2)^2 - 2(2) + 1$

$y = 4 - 4 + 1$

$y = 0 + 1$

$y = 1$

Putting 3 in eq(i),

$y = x^2 - 2x + 1$

$y = (3)^2 - 2(3) + 1$

$y = 9 - 6 + 1$

$y = 3 + 1$

$y = 4$

Putting 4 in eq(i),

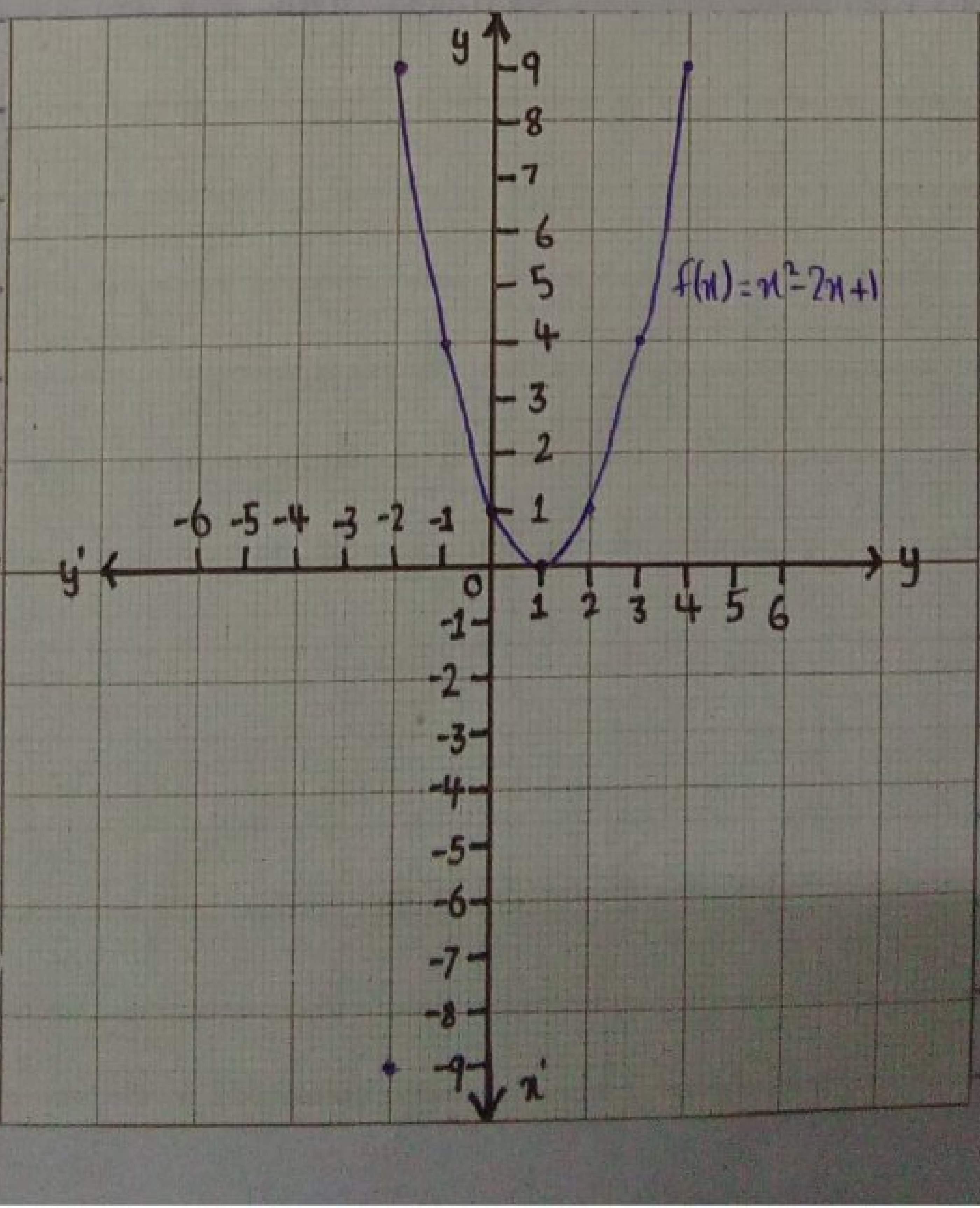
$y = x^2 - 2x + 1$

$y = (4)^2 - 2(4) + 1$

$y = 16 - 8 + 1$

$y = 8 + 1$

$y = 9$



(ii) $f(x) = x^2 - 7x + 12$

let $y = f(x)$

$y = x^2 - 7x + 12 \rightarrow eq(i)$

* Finding x-intercept:

Put $y = 0$ in eq(i),

$y = x^2 - 7x + 12$

$x^2 - 7x + 12 = 0$

Using factorization:

$x^2 - 3x - 4x + 12 = 0$

$x(x-3) - 4(x-3) = 0$

$(x-3)(x-4) = 0$

$x - 3 = 0$ | $x - 4 = 0$

$\boxed{x = 3}$ | $\boxed{x = 4}$

So $(3,0)$ & $(4,0)$

* Finding y-intercept:

Put $x = 0$ in eq(i),

$y = x^2 - 7x + 12$

$y = (0)^2 - 7(0) + 12$

$y = 0 - 0 + 12$

$\boxed{y = 12}$

So $(0,12)$

* Finding vertex:

$x = \frac{-b}{2a}$

$x = \frac{-(-7)}{2(1)}$

$x = \frac{7}{2}$

$x = 3.5$

Putting the value of x in eq(i) to find y,

$y = x^2 - 7x + 12$

$y = (3.5)^2 - 7(3.5) + 12$

$y = 12.25 - 24.5 + 12$

$y = -0.25$ So $(3.5, -0.25)$

* Plotting:

(i) $a > 0$ open upward

(ii) $b < 0$ point of vertex is horizontally right

(iii) $c = 12$ so $(0,12)$ intercept

(iv) x vertex are $(3,0)$ & $(4,0)$

x	0	1	2	3	4	5
y	12	6	2	0	0	2

6	7
6	12

3.5
-0.25

Put 0 in eq(i),

$y = x^2 - 7x + 12$

$y = (0)^2 - 7(0) + 12$

$y = 0 - 0 + 12$

$y = 12$

Put 1 in eq(i),

$y = x^2 - 7x + 12$

$y = (1)^2 - 7(1) + 12$

$y = 1 - 7 + 12$

$y = 6$

Put 2 in eq(i),

$y = x^2 - 7x + 12$

$y = (2)^2 - 7(2) + 12$

$y = 4 - 14 + 12$

$y = 2$

Put 3 in eq(i),

$y = x^2 - 7x + 12$

$y = (3)^2 - 7(3) + 12$

$y = 9 - 21 + 12$

$y = 0$

Put 4 in eq(i),

$y = x^2 - 7x + 12$

$y = (4)^2 - 7(4) + 12$

$y = 16 - 28 + 12$

$y = 0$

Put 5 in eq(i),

$y = x^2 - 7x + 12$

$y = (5)^2 - 7(5) + 12$

$y = 25 - 35 + 12$

$y = 2$

Put 6 in eq(i),

$y = x^2 - 7x + 12$

$y = (6)^2 - 7(6) + 12$

$y = 36 - 42 + 12$

$y = 6$

Put 7 in eq(i),

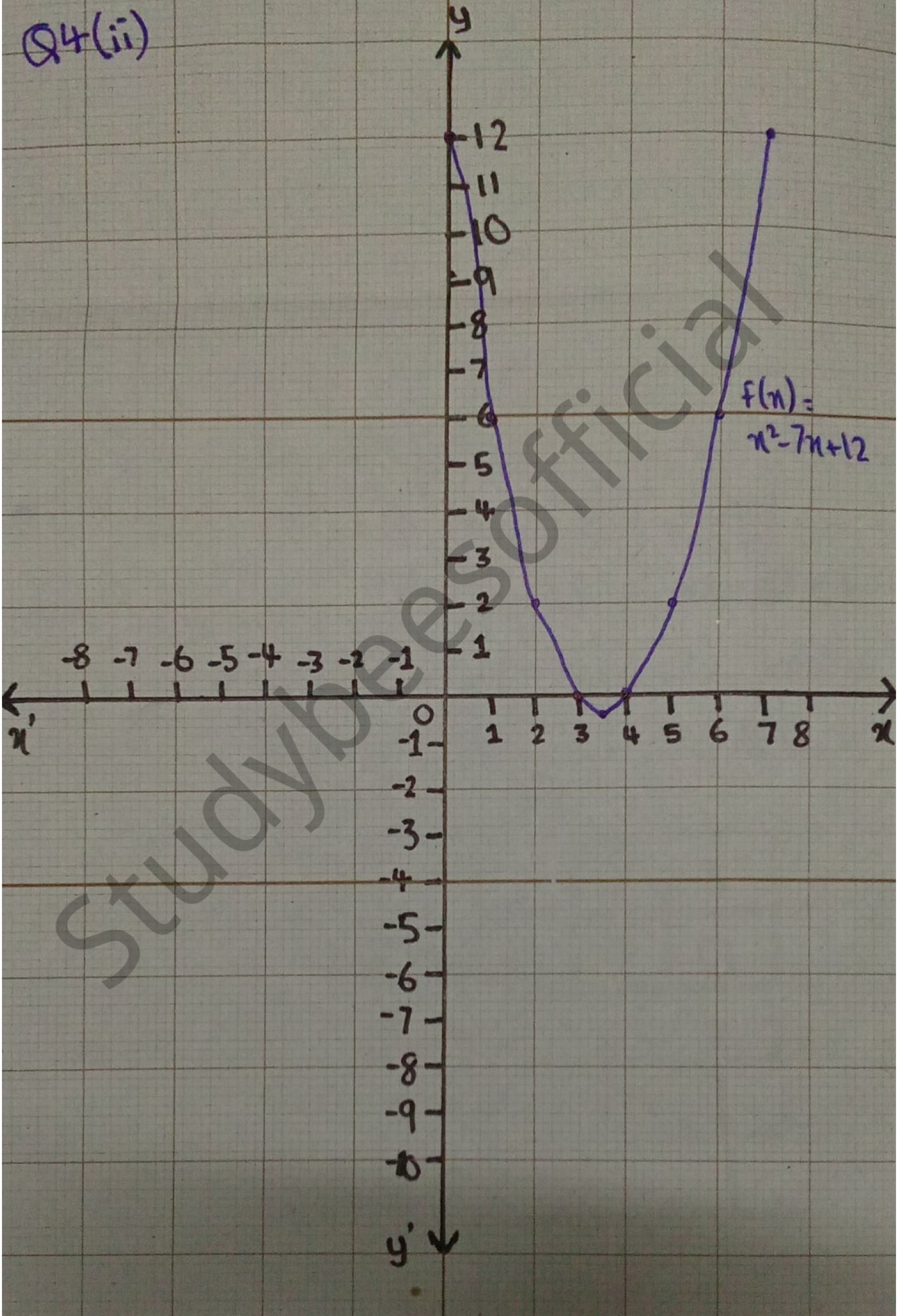
$y = x^2 - 7x + 12$

$y = (7)^2 - 7(7) + 12$

$y = 49 - 49 + 12$

$y = 12$

Q4(ii)



y
12
11
10
9
8
7
6
5
4
3
2
1
-8 -7 -6 -5 -4 -3 -2 -1
0
1 2 3 4 5 6 7 8
x
x'
-1
-2
-3
-4
-5
-6
-7
-8
-9
-10
y'
f(x) =
x²-7x+12

(iii) $f(x) = x^2 - 2x$

let, $y = f(x)$

$y = x^2 - 2x \longrightarrow eq(i)$

* **Finding x-intercept:**

Put $y = 0$ in eq(i),

$y = x^2 - 2x$

$0 = x^2 - 2x$

$x^2 - 2x = 0$

$x(x-2) = 0$

$\boxed{x = 0}$ | $x - 2 = 0$, $\boxed{x = 2}$

so $(0,0)$ & $(2,0)$

* **Finding y-intercept:**

Put $x = 0$ in eq(i),

$y = x^2 - 2x$

$y = (0)^2 - 2(0)$

$y = 0 - 0$

$\boxed{y = 0}$

so $(0,0)$

* **Finding vertex:**

$x = \frac{-b}{2a}$

$x = \frac{-(-2)}{2(1)}$

$x = \frac{2}{2}$

$\boxed{x = 1}$

Putting the value of x in eq(i) to find y,

$y = x^2 - 2x$

$y = (1)^2 - 2(1)$

$y = 1 - 2$

$\boxed{y = -1}$

so $(1, -1)$

* **Plotting:**

(i) $a > 0$ open upward

(ii) $b < 0$ the vertex is horizontally right

(iii) $c = 0$ so $(0,0)$ is intercept

(iv) x & vertex are $(0,0)$ & $(2,0)$

x	-1	0	1	2	3
y	3	0	-1	0	3

Putting -1 in eq(i),

$y = x^2 - 2x$

$y = (-1)^2 - 2(-1)$

$y = 1 + 2$

$y = 3$

Putting 0 in eq(i),

$y = x^2 - 2x$

$y = (0)^2 - 2(0)$

$y = 0 - 0$

$y = 0$

Putting 1 in eq(i),

$y = x^2 - 2x$

$y = (1)^2 - 2(1)$

$y = 1 - 2$

$y = -1$

Putting 2 in eq(i),

$y = x^2 - 2x$

$y = (2)^2 - 2(2)$

$y = 4 - 4$

$y = 0$

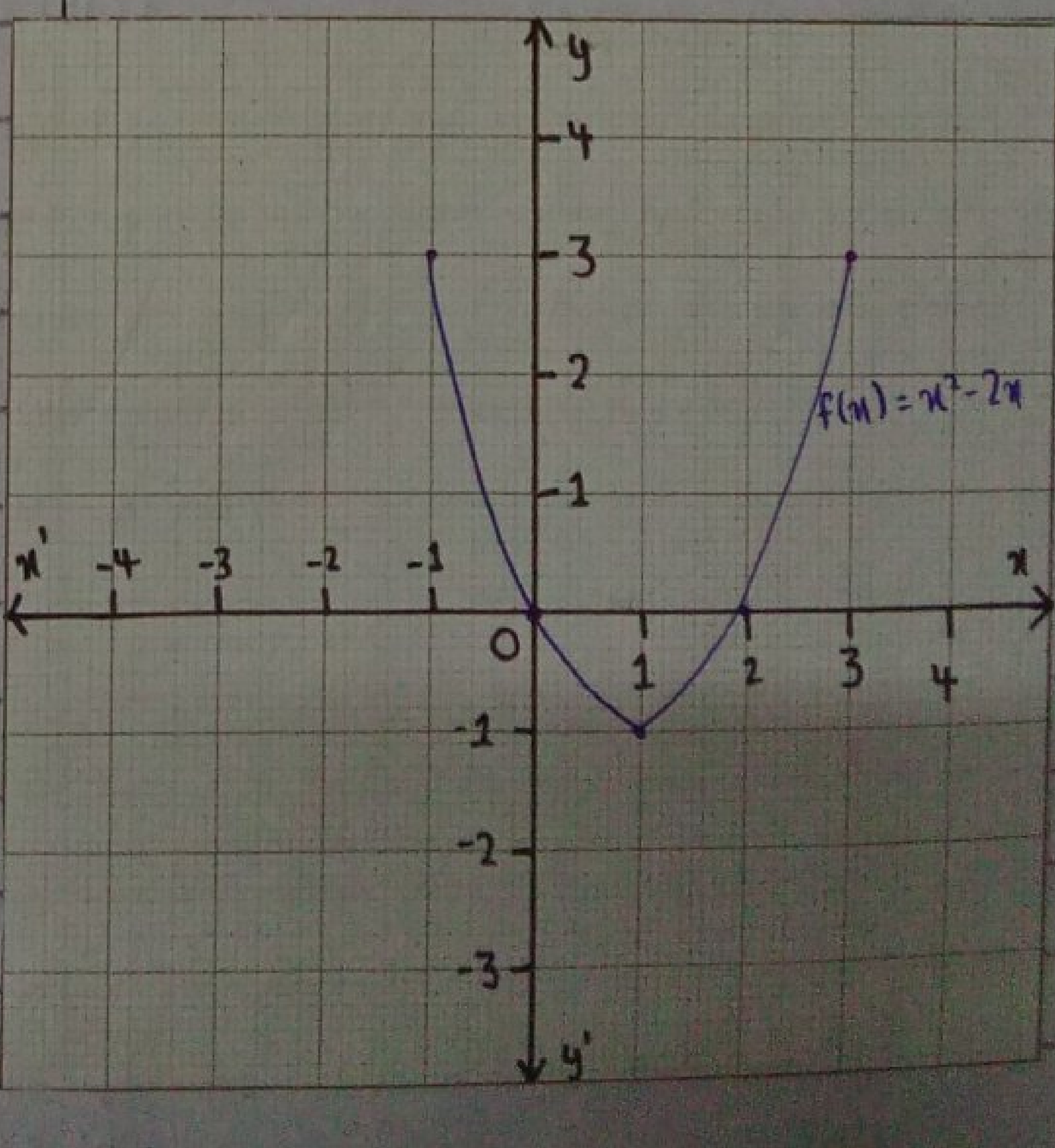
Putting 3 in eq(i),

$y = x^2 - 2x$

$y = (3)^2 - 2(3)$

$y = 9 - 6$

$y = 3$



(iv) $f(x) = -2x^2+x+3$

let, $y = f(x)$

$y = -2x^2+x+3$ — eq(i)

★ Finding x-intercept:

Put $y=0$ in eq(i),

$y = -2x^2+x+3$

$-2x^2+x+3 = 0$

$-(2x^2-x-3) = 0$

$2x^2-x-3 = \frac{0}{-1}$

$2x^2-3x+2x-3 = 0$

$x(2x-3)+1(2x-3) = 0$

$(x+1)(2x-3) = 0$

$x+1 = 0$, $\boxed{x = -1}$ | $2x-3 = 0$, $2x = 3$, $x = \frac{3}{2}$, $\boxed{x = 1.5}$

So $(-1,0)$ & $(1.5,0)$

★ Finding y-intercept:

Put $x=0$ in eq(i),

$y = -2x^2+x+3$

$y = -2(0)^2+(0)+3$

$y = 0+0+3$

$\boxed{y = 3}$

So $(0,3)$

★ Finding vertex:

$x = \frac{-b}{2a}$

$x = \frac{-(1)}{2(-2)}$

$x = \frac{-1}{-4}$

$x = \frac{1}{4}$

$\boxed{x = 0.25}$

Putting the value of x in eq(i) to find y,

$y = -2x^2+x+3$

$y = -2(0.25)^2+(0.25)+3$

$y = -2(0.06)+3.25$

$y = -0.12+3.25$

$y = 3.13$

So $(0.25, 3.13)$ is the vertex

★ Plotting:

(i) $a<0$ open downward

(ii) $b>0$ vertex is horizontally left

(iii) $c=3$ so $(3,0)$ intercept

(iv) x vertex are $(-1,0)$ & $(1.5,0)$

x	[illegible]	-1.5	-1	-0.5	0
y	[illegible]	-3	0	2	3

0.25	0.5	1	1.5	2
3.13	2.75	2	0	-3

Put -2 in eq(i), Put -1.5 in eq(i), Put -1 in eq(i),

$y = -2x^2+x+3$ $\quad$ $y = -2x^2+x+3$ $\quad$ $y = -2x^2+x+3$

$y = -2(-2)^2+(-2)+3$ $\quad$ $y = -2(-1.5)^2+(-1.5)+3$ $\quad$ $y = -2(-1)^2+(-1)+3$

$y = -2(4)-2+3$ $\quad$ $y = -2(2.25)-1.5+3$ $\quad$ $y = -2(1)-1+3$

$y = -8+1$ $\quad$ $y = -4.5+1.5$ $\quad$ $y = -2+2$

$y = -7$ $\quad$ $y = -3$ $\quad$ $y = 0$

Put -0.5 in eq(i), Put 0 in eq(i), Put 0.25 in eq(i)

$y = -2x^2+x+3$ $\quad$ $y = -2x^2+x+3$ $\quad$ $y = -2x^2+x+3$

$y = -2(-0.5)^2+(-0.5)+3$ $\quad$ $y = -2(0)^2+0+3$ $\quad$ $y = -2(0.25)^2+0.25+3$

$y = -2(0.25)-0.5+3$ $\quad$ $y = 0+3$ $\quad$ $y = -2(0.06)+3.25$

$y = -0.5+2.5$ $\quad$ $y = 3$ $\quad$ $y = -0.12+3.25$

$y = 2$ $\quad$ $y = 3.13$

Put 0.5 in eq.(i),

$y = -2x^2+x+3$

$y = -2(0.5)^2+(0.5)+3$

$y = -2(0.25)+3.25$

$y = -0.5+3.25$

$y = 2.75$

Put 1 in eq.(i),

$y = -2x^2+x+3$

$y = -2(1)^2+(1)+3$

$y = -2(1)+4$

$y = -2+4$

$y = 2$

Put 1.5 in eq.(i),

$y = -2x^2+x+3$

$y = -2(1.5)^2+(1.5)+3$

$y = -2(2.25)+4.5$

$y = -4.5+4.5$

$y = 0$

Put 2 in eq.(i),

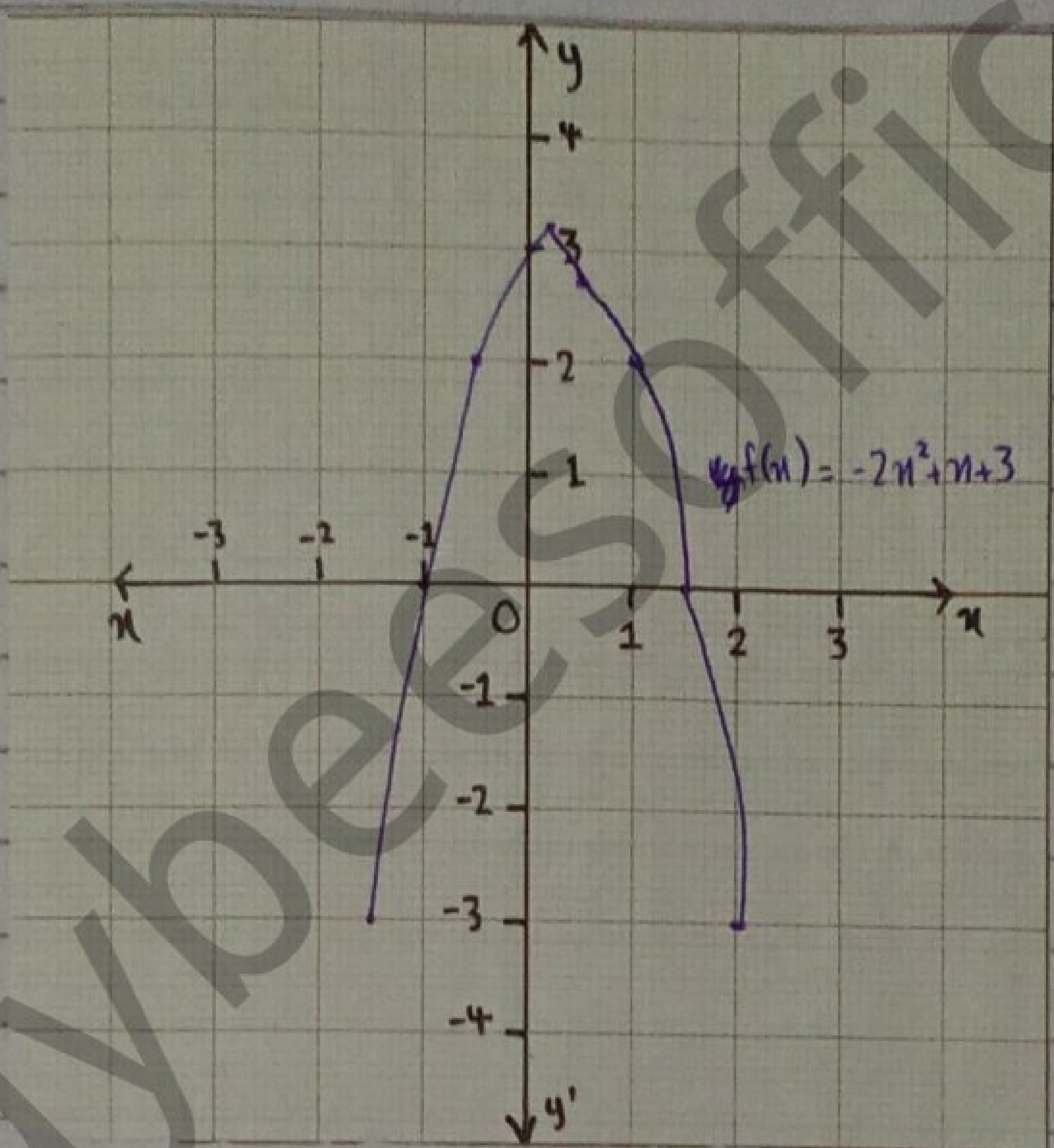
$y = -2x^2+x+3$

$y = -2(2)^2+(2)+3$

$y = -2(4)+5$

$y = -8+5$

$y = -3$



(v) $f(x) = 4x^2-4x$

let, $y = f(x)$

$y = 4x^2-4x$ —eq.(i)

★ Finding x-intercept:

Put $y=0$ in eq.(i),

$0 = 4x^2-4x$

$4x(x-1) = 0$

$x-1=0$	$4x=0$
$\boxed{x=1}$	$x=\frac{0}{4}$
	$\boxed{x=0}$

So $(1,0)$ & $(0,0)$

* **Finding y-intercept:**

Put $x=0$ in eq(i),

$y=4x^2-4x$

$y=4(0)^2-4(0)$

$y=0-0$

$\boxed{y=0}$

so $(0,0)$

* **Finding Vertex:**

$x=\frac{-b}{2a}$

$x=\frac{-(-4)}{2(4)}$

$x=\frac{4}{8}$

$x=\frac{1}{2}$

$\boxed{x=0.5}$

Putting the value of x in eq(i) to find y,

$y=4x^2-4x$

$y=4(0.5)^2-4(0.5)$

$y=4(0.25)-2$

$y=1-2$

$\boxed{y=-1}$

So $(0.5,-1)$ vertex

Putting -1 in eq(i),

$y=4x^2-4x$

$y=4(-1)^2-4(-1)$

$y=4(1)+4$

$y=4+4$

$y=8$

Putting -0.5 in eq(i),

$y=4x^2-4x$

$y=4(-0.5)^2-4(-0.5)$

$y=4(0.25)+2$

$y=1+2$

$y=3$

Putting 0 in eq(i),

$y=4x^2-4x$

$y=4(0)^2-4(0)$

$y=4(0)-0$

$y=0-0$

$y=0$

Putting 0.5 in eq(i),

$y=4x^2-4x$

$y=4(0.5)^2-4(0.5)$

$y=4(0.25)-2$

$y=1-2$

$y=-1$

Putting 1 in eq(i),

$y=4x^2-4x$

$y=4(1)^2-4(1)$

$y=4-4$

$y=0$

Putting 1.5 in eq(i),

$y=4x^2-4x$

$y=4(1.5)^2-4(1.5)$

$y=4(2.75)-6$

$y=9-3$

$y=3$

Putting 2 in eq(i),

$y=4x^2-4x$

$y=4(2)^2-4(2)$

$y=4(4)-8$

$y=16-8$

$y=8$

* **Plotting:**

(i) $a>0$ open upward

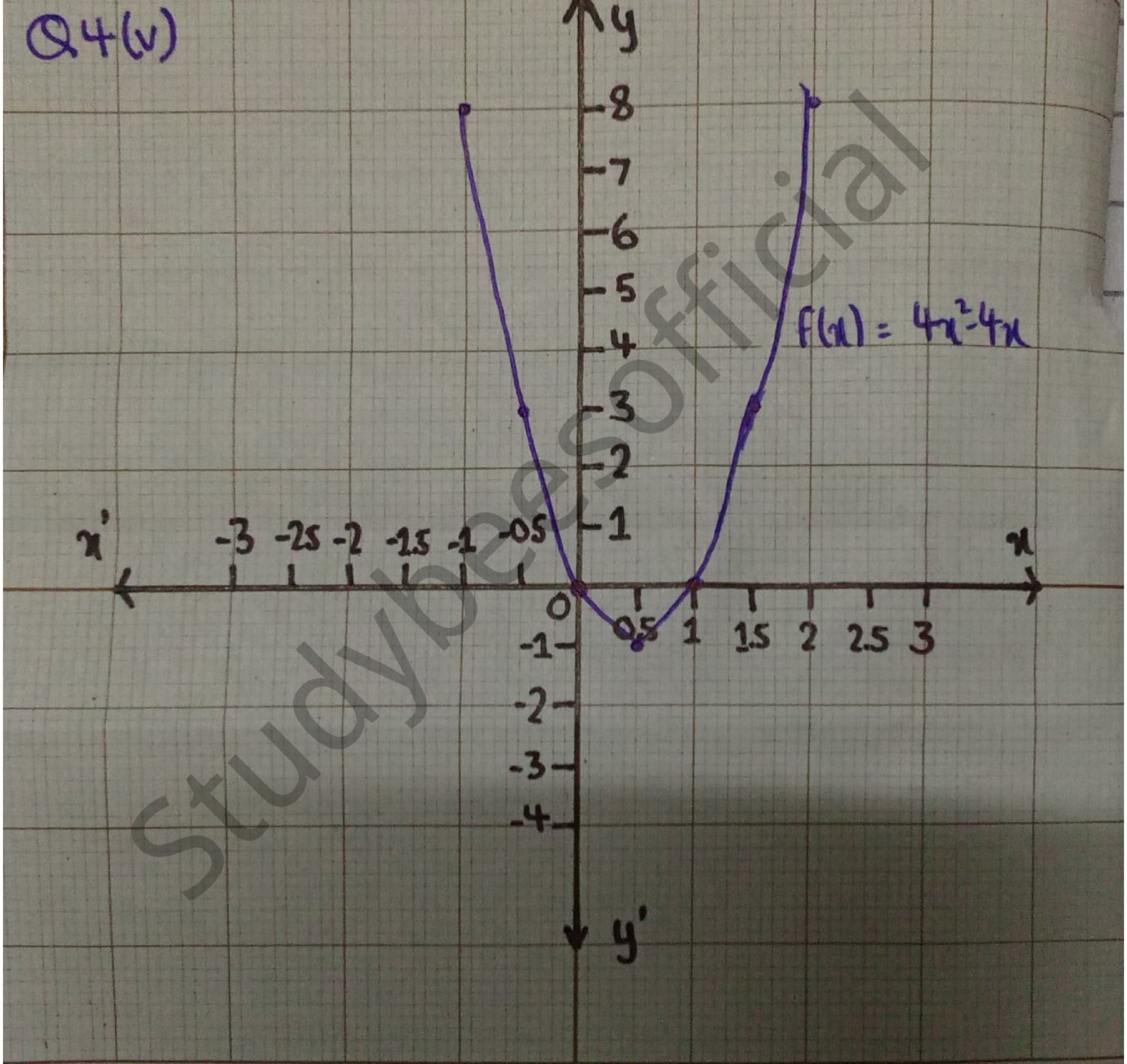
(ii) $b<0$ vertex is horizontally left

(iii) $c=0$ so $(0,0)$ point of intercept

(iv) x vertex are $(1,0)$ & $(0,0)$

x	-1	-0.5	0	0.5	1	1.5	2
y	8	3	0	-1	0	3	8

Q4(v)



(vi) $f(x) = 6 - x^2 - x$

let, $y = f(x)$

$y = 6 - x^2 - x$ — eq.(i)

★ Finding x-intercept:

Put $y=0$ in eq.(i),

$y = 6 - x^2 - x$

$0 = -x^2 - x + 6$

$0 = -(x^2 + x - 6)$

$x^2 + x - 6 = \frac{0}{-1}$

$x^2 + 3x - 2x - 6 = 0$

$x(x+3) - 2(x+3) = 0$

$(x+3)(x-2) = 0$

$x+3=0$ | $x-2=0$

$\boxed{x=-3}$ | $\boxed{x=2}$

So $(-3,0)$ & $(2,0)$

★ Finding y-intercept:

Put $x=0$ in eq.(i),

$y = 6 - x^2 - x$

$y = 6 - (0)^2 - (0)$

$y = 6 - 0 - 0$

$\boxed{y = 6}$

So $(0,6)$

★ Finding vertex:

$x = \frac{-b}{2a}$

$x = \frac{-(-1)}{2(-1)}$

$x = \frac{1}{-2}$

$x = -0.5$

Putting the value of x in eq.(i) to find y.

$y = 6 - x^2 - x$

$y = 6 - (-0.5)^2 - (-0.5)$

$y = 6 - (0.25) + 0.5$

$y = 6.25$

So $(-0.5, 6.25)$ vertex

★ Plotting:

(i) $a < 0$ open downward

(ii) $b < 0$ vertex is horizontally left

(iii) $c = 6$ so $(6,0)$ point of intercept

(iv) x vertex are $(-3,0)$ & $(2,0)$

x	-4	-3	-2	-1	-0.5	0	0.5	1	2	3
y	-6	0	4	6	6.25	6	5.25	4	0	-6

Put -4 in eq.(i),

$y = 6 - x^2 - x$

$y = 6 - (-4)^2 - (-4)$

$y = 6 - (16) + 4$

$y = 6 - 16 + 4$

$y = -6$

Put -3 in eq.(i),

$y = 6 - x^2 - x$

$y = 6 - (-3)^2 - (-3)$

$y = 6 - (9) + 3$

$y = 6 - 9 + 3$

$y = 0$

Put -2 in eq.(i),

$y = 6 - x^2 - x$

$y = 6 - (-2)^2 - (-2)$

$y = 6 - (4) + 2$

$y = 6 - 4 + 2$

$y = 4$

Put -1 in eq.(i),

$y = 6 - x^2 - x$

$y = 6 - (-1)^2 - (-1)$

$y = 6 - (1) + 1$

$y = 6 - 1 + 1$

$y = 6$

Put -0.5 in eq.(i),

$y = 6 - x^2 - x$

$y = 6 - (-0.5)^2 - (-0.5)$

$y = 6 - (0.25) + 0.5$

$y = 6.25$

Put 0 in eq.(i),

$y = 6 - x^2 - x$

$y = 6 - (0)^2 - (0)$

$y = 6 - 0 - 0$

$y = 6$

Put 1 in eq.(i),

$y = 6 - x^2 - x$

$y = 6 - (1)^2 - (1)$

$y = 6 - 1 - 1$

$y = 4$

Put 0.5 in eq.(i),

$y = 6 - x^2 - x$

$y = 6 - (0.5)^2 - (0.5)$

$y = 6 - (0.25) - 0.5$

$y = 5.25$

Put 2 in eq.(i),

$y = 6 - x^2 - x$

$y = 6 - (2)^2 - (2)$

$y = 6 - 4 - 2$

$y = 0$

Put 3 in eq.(i),

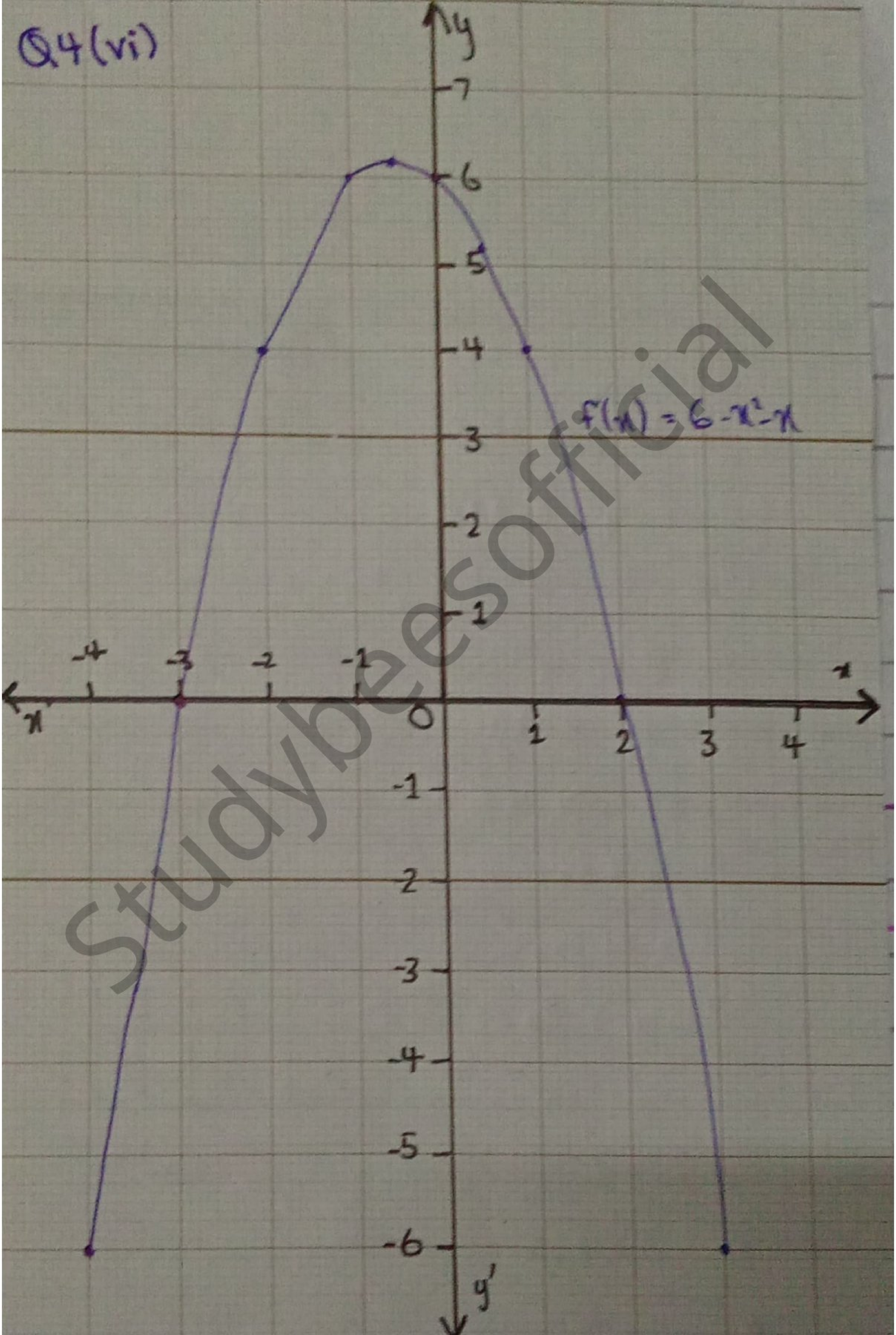
$y = 6 - (3)^2 - (3)$

$y = 6 - 9 - 3$

$y = -3 - 3$

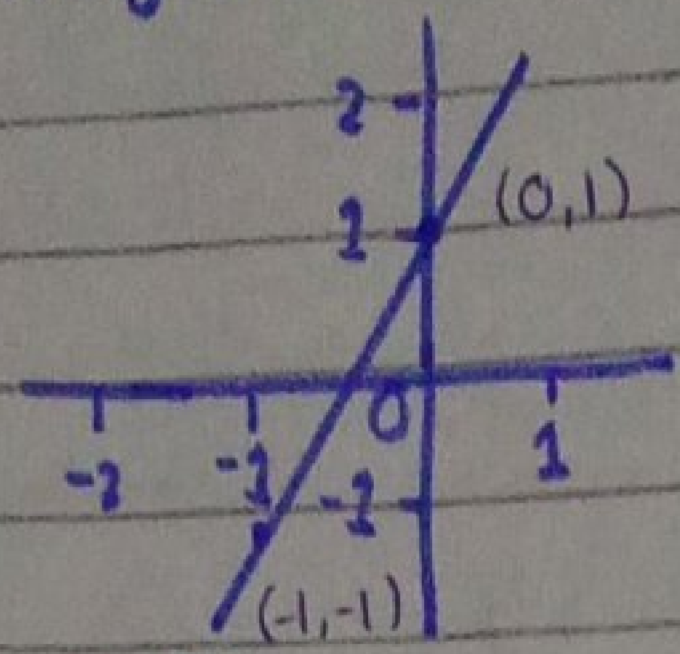
$y = -6$

Q4(vi)



Q5 Predict algebraic functions from following graphs:

(i)



$\overset{x_1\ y_1}{(0,1)}, \overset{x_2\ y_2}{(-1,-1)}$ are the co-ordinates

slope = m = $\frac{y_2 - y_1}{x_2 - x_1}$

slope = m = $\frac{(-1)-(1)}{(-1)-(0)}$

slope = m = $\frac{-1-1}{-1-0}$

slope = m = $\frac{-2}{-1}$

$\boxed{\text{slope} = m = 2}$

* Using line equation:

(i) $y - y_1 = m(x - x_1)$

$y - (1) = 2(x - 0)$

$y - 1 = 2x$

$\boxed{y = 2x + 1}$

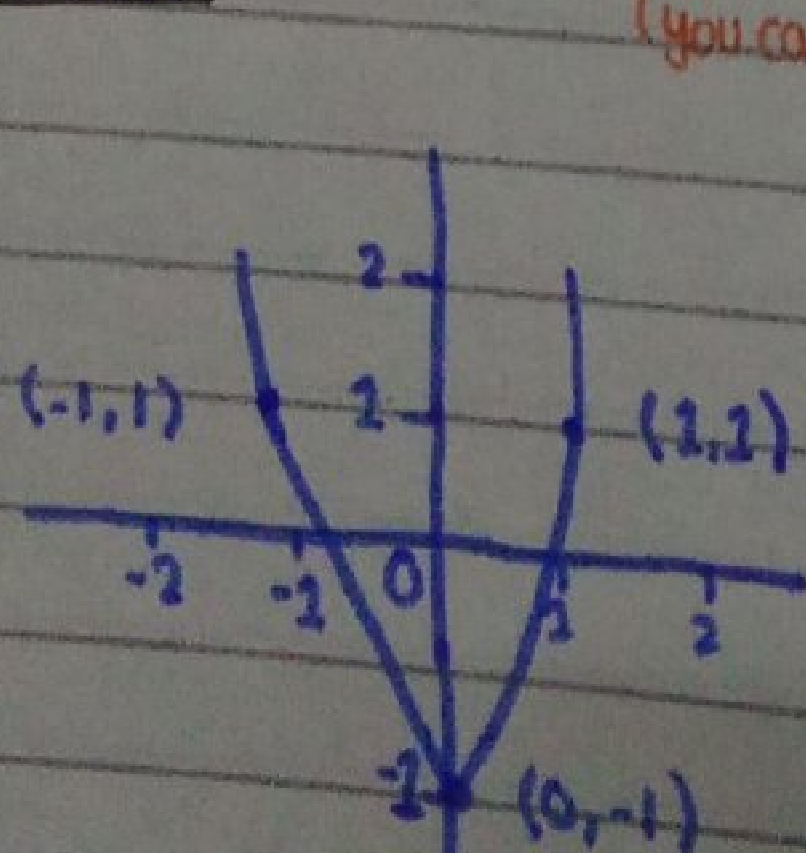
(ii) $y = mx + c$

$y = (2)x + 1$ — *c is y-intercept

$\boxed{y = 2x + 1}$

(you can use either of the two equations)

(ii)



* **Using Parabola equation:**

$$y-r = a(x-p)(x-q)$$

$$y-1 = a(x-(-1))(x-(1))$$

$$y-1 = a(x+1)(x-1) \quad \text{— eq(i)}$$

Since $(0,-1)$ is the vertex at parabola, so this satisfies the equation of parabola,

So,

$$(-1)-1 = a(0+1)(0-1)$$

$$-1-1 = a(1)(-1)$$

$$-2 = -a$$

$$\boxed{a = 2}$$

$\because a>0$ so open upward

Putting the value of a in eq(i),

$$y-1 = a(x+1)(x-1)$$

$$y-1 = 2[(x)^2-(1)^2]$$

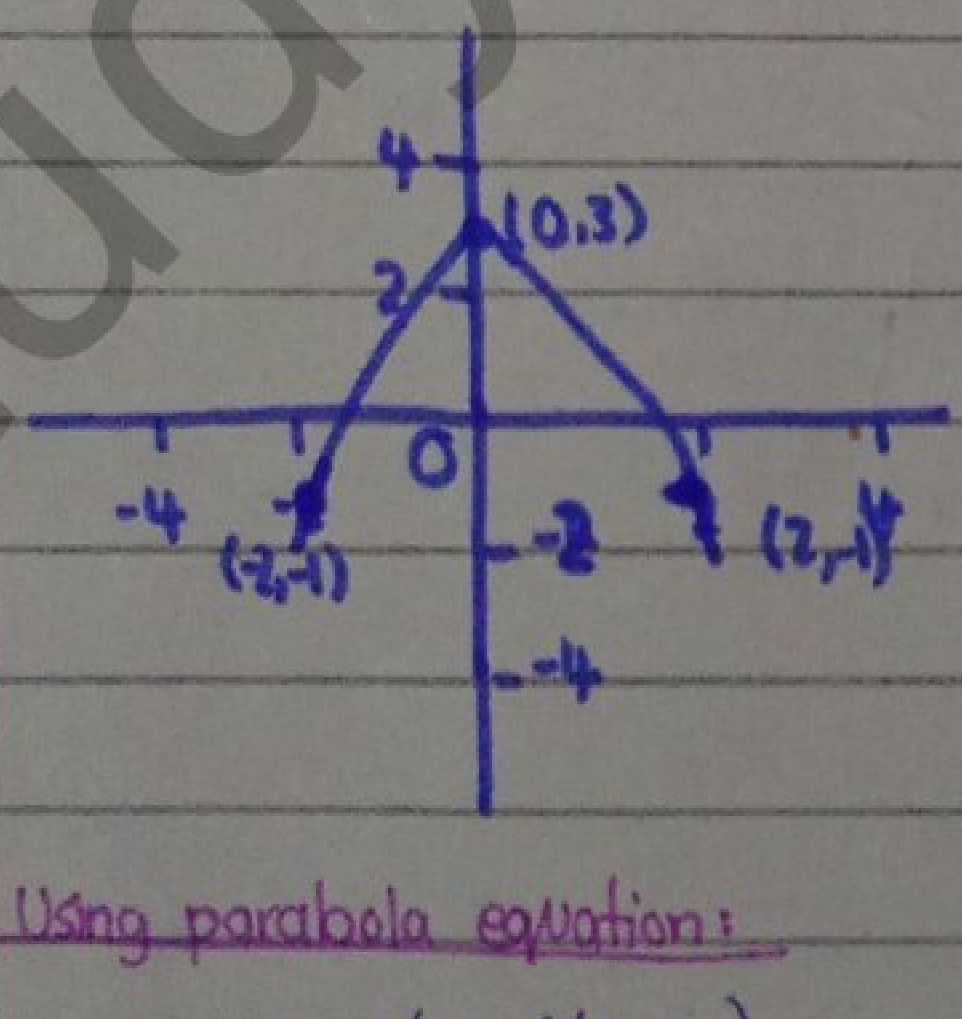
$$y-1 = 2(x^2-1)$$

$$y-1 = 2x^2-2$$

$$y = 2x^2-2+1$$

$$\boxed{y = 2x^2-1}$$

(iii)



* **Using parabola equation:**

$$y-r = a(x-p)(x-q)$$

$$y-(-1) = a(x-(-2))(x-(2))$$

$$y+1 = a(x+2)(x-2) \quad \text{— eq(i)}$$

Since $(0,3)$ is the vertex at parabola, so this satisfies the equation of parabola,

So,

$$3+1 = a(0+2)(0-2)$$

$$4 = a(2)(-2)$$

$$4 = a(-4)$$

$$a = \frac{\cancel{4}^{1}}{-\cancel{4}_{1}}$$

$$\boxed{a = -1}$$

$\because a < 0$ so open downward

Putting the value of a in eq(i),

$$y+1 = a(x+2)(x-2)$$

$$y+1 = (-1)\left[(x)^2-(2)^2\right]$$

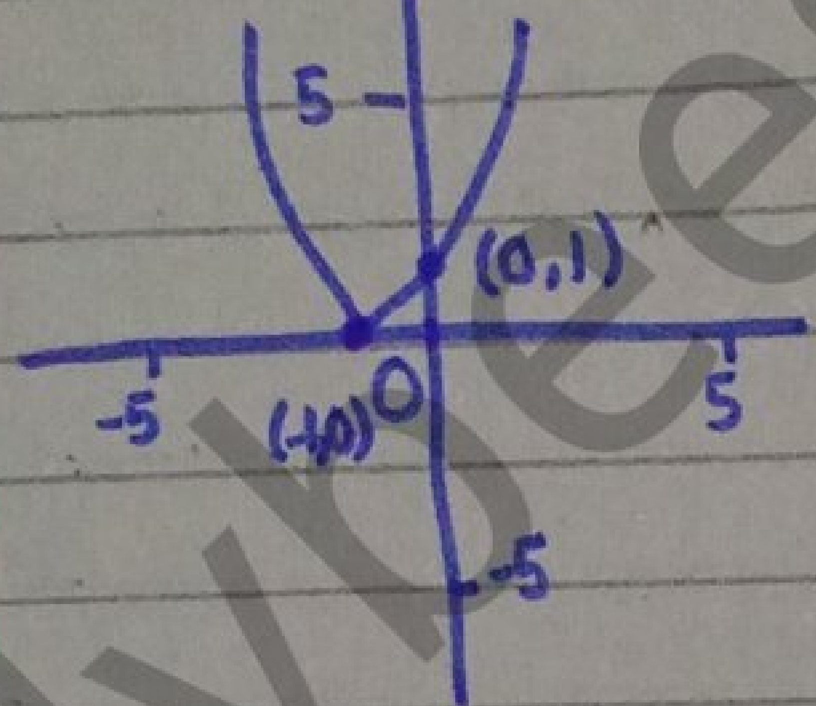
$$y+1 = (-1)(x^2-4)$$

$$y+1 = -x^2+4$$

$$y = -x^2+4-1$$

$$\boxed{y = -x^2+3}$$

(iv)



$a = 1$

★ Using parabola equation:

$$y-r = a(x-p)(x-q)$$

$$p = -1,\ q = -1,\ a = 1,\ r = 0$$

$$y-0 = 1(x-(-1))(x-(-1))$$

$$y = 1(x+1)(x+1)$$

$$y = 1(x+1)^2$$

$$\boxed{y = (x+1)^2}$$

Q6 Plot the graph of following and find point of intersectio of function with axes.

(i) $y = x+3$ — eq(i)

★ Finding x-intercept:

Putting $y=0$ in eq(i),

$$y = x+3$$

$0 = x + 3$

$\boxed{x = -3}$

So, $(-3, 0)$

★ Finding y-intercept:

Putting $x = 0$ in ,

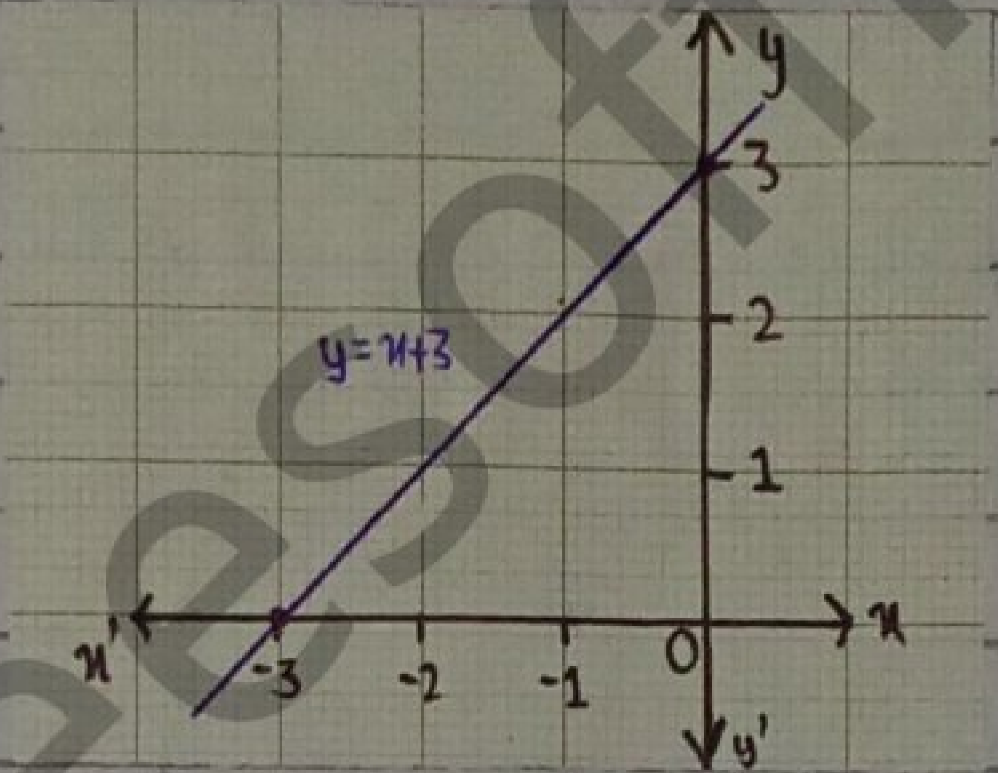
$y = x + 3$

$y = 0 + 3$

$\boxed{y = 3}$

So $(0, 3)$

★ Plotting:



(ii) $y = 6 - 3x$ — eq (i)

★ Finding x-intercept:

Putting $y = 0$ in eq (i),

$y = 6 - 3x$

$0 = 6 - 3x$

$-3x = -6$

$x = \frac{\cancel{-6}^{2}}{\cancel{-3}_{1}}$

$x = 2$

So $(2, 0)$

★ Finding y-intercept:

Putting $x = 0$ in eq (i),

$y = 6 - 3x$

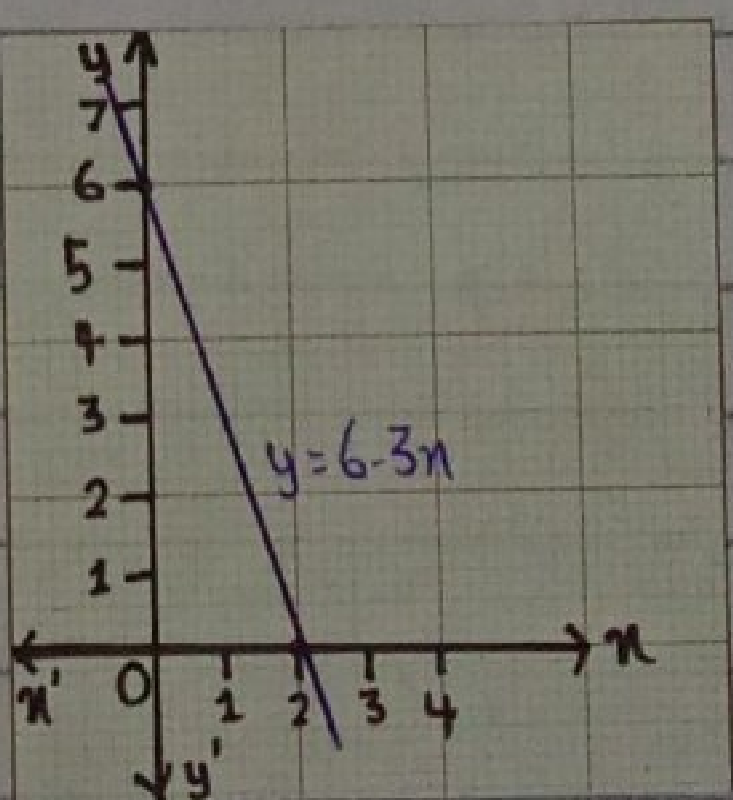
$y = 6 - 3(0)$

$y = 6 - 0$

$y = 6$

So, $(0, 6)$

★ Plotting:



(iii) $y = x^2 - 5x$ ...eq.(i)

* Finding x-intercept:

Putting $y = 0$ in eq.(i),

$y = x^2 - 5x$

$0 = x^2 - 5x$

$0 = x(x-5)$

$\boxed{x=0}$ | $x-5=0$

$\boxed{x=5}$

So $(0,0)$ & $(5,0)$

* Finding y-intercept:

Putting $x=0$ in eq.(i),

$y = x^2 - 5x$

$y = (0)^2 - 5(0)$

$y = 0-0$

$\boxed{y=0}$

So $(0,0)$

* Finding Vertex:

$x = \frac{-b}{2a}$

$x = \frac{-(-5)}{2(1)}$

$x = \frac{5}{2}$

$\boxed{x = 2.5}$

Putting the value of x in to find y,

$y = x^2 - 5x$

$y = (2.5)^2 - 5(2.5)$

$y = 6.25 - 12.5$

$\boxed{y = -6.25}$

So $(2.5, -6.25)$ point of vertex

Q7 Find graphical solution of :

(i) $f(x) = 4-3x$; $g(x) = -x+1$

let,

$y = 4-3x$ — eq(i)

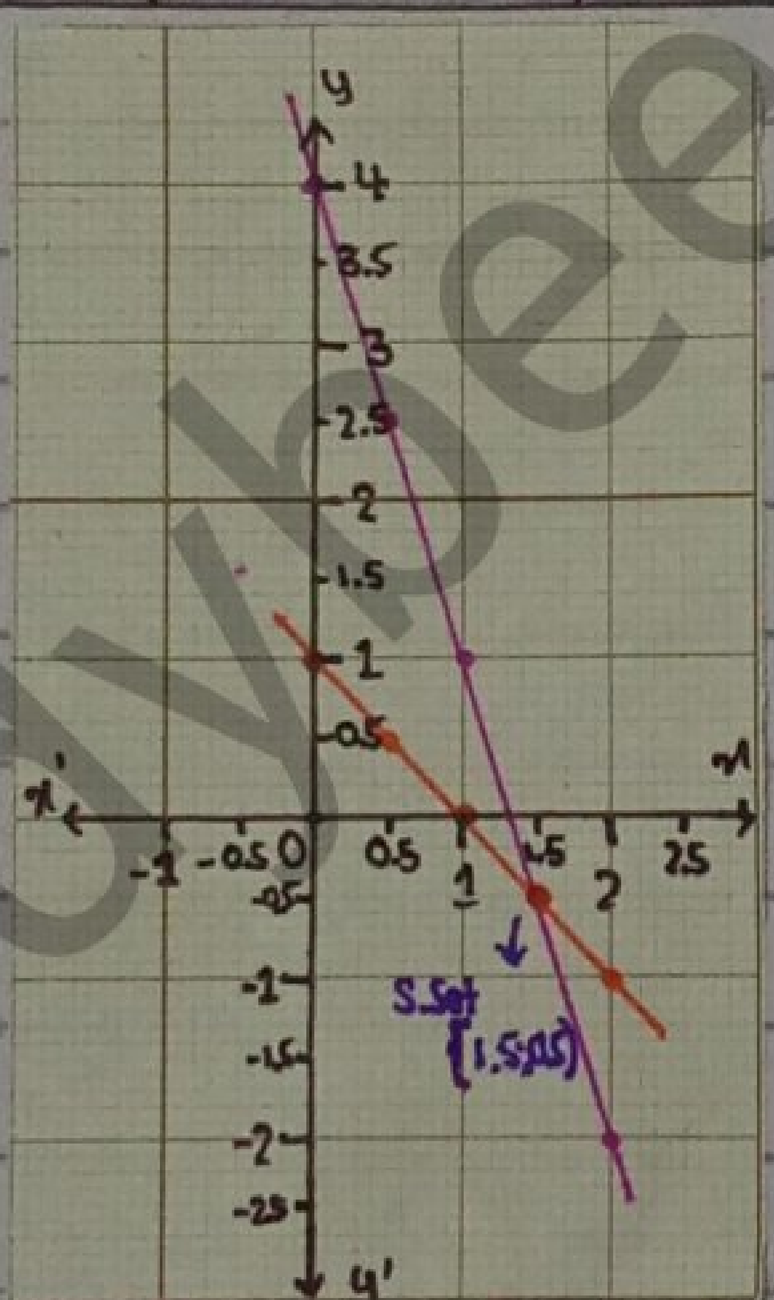
$y = -x+1$ — eq(ii)

Table for eq(i),

x	0	0.5	1	1.5	2
y	4	2.5	1	-0.5	-2

Table for eq(ii),

x	0	0.5	1	1.5	2
y	1	0.5	0	-0.5	-1



Hence Answer is,
(1.5 , -0.5)

(ii) $f(x) = 2(2+x)$; $g(x) = x^2+1$

let,

$y = 2(2+x) \Rightarrow y = 4+2x$ — eq(i)

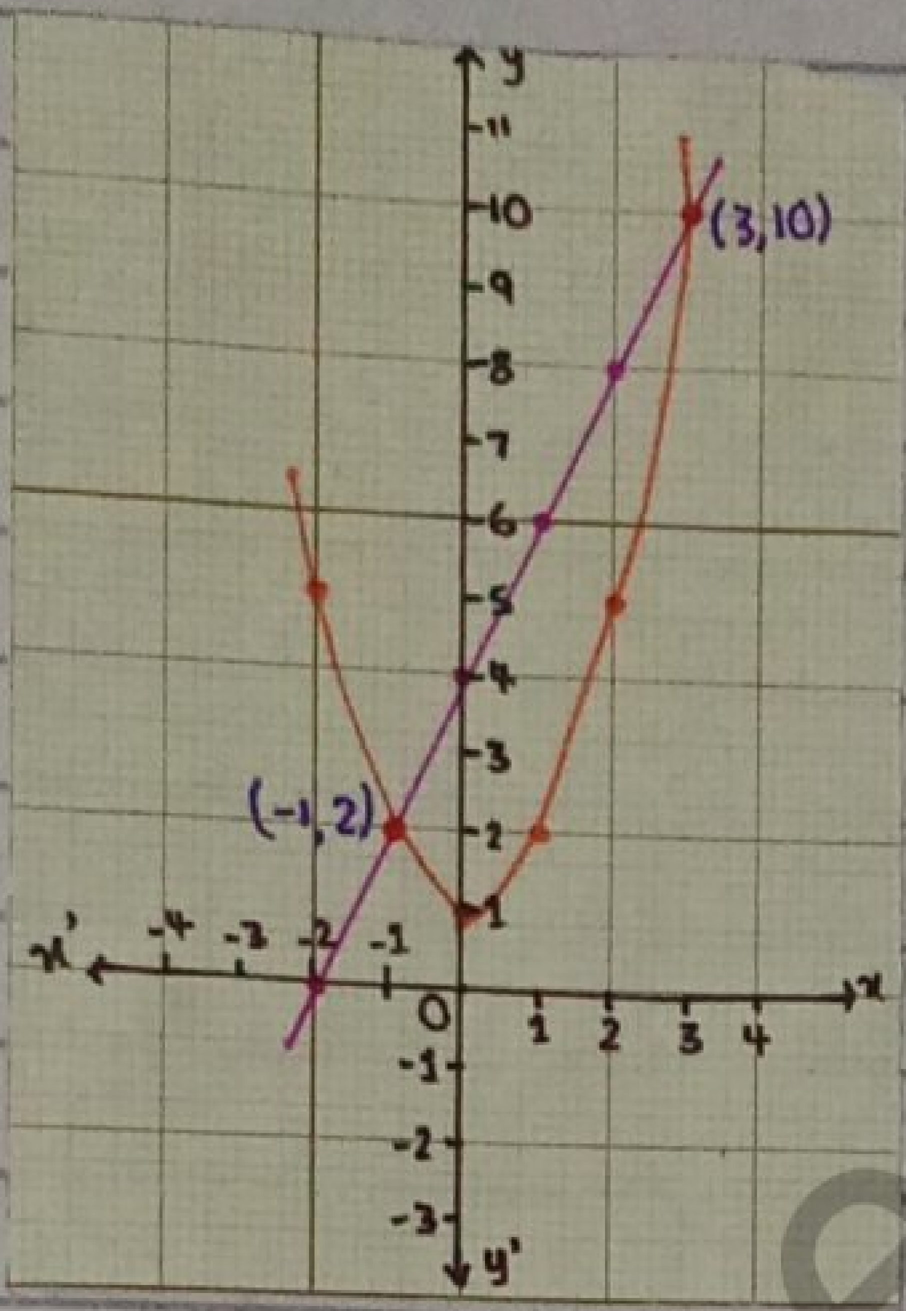
$y = x^2+1$ — eq(ii)

Table for eq(i),

x	-2	-1	0	1	2	3	~~4~~
y	0	2	4	6	8	10	~~12~~

Table for eq(ii),

x	-2	-1	0	1	2	3
y	5	2	1	2	5	10



Hence Answer is,
(-1,2) & (3,10)

(iii) $f(x) = 5+3x$; $g(x) = -x^2+5$

let,

$y = 5+3x$ — eq(i)

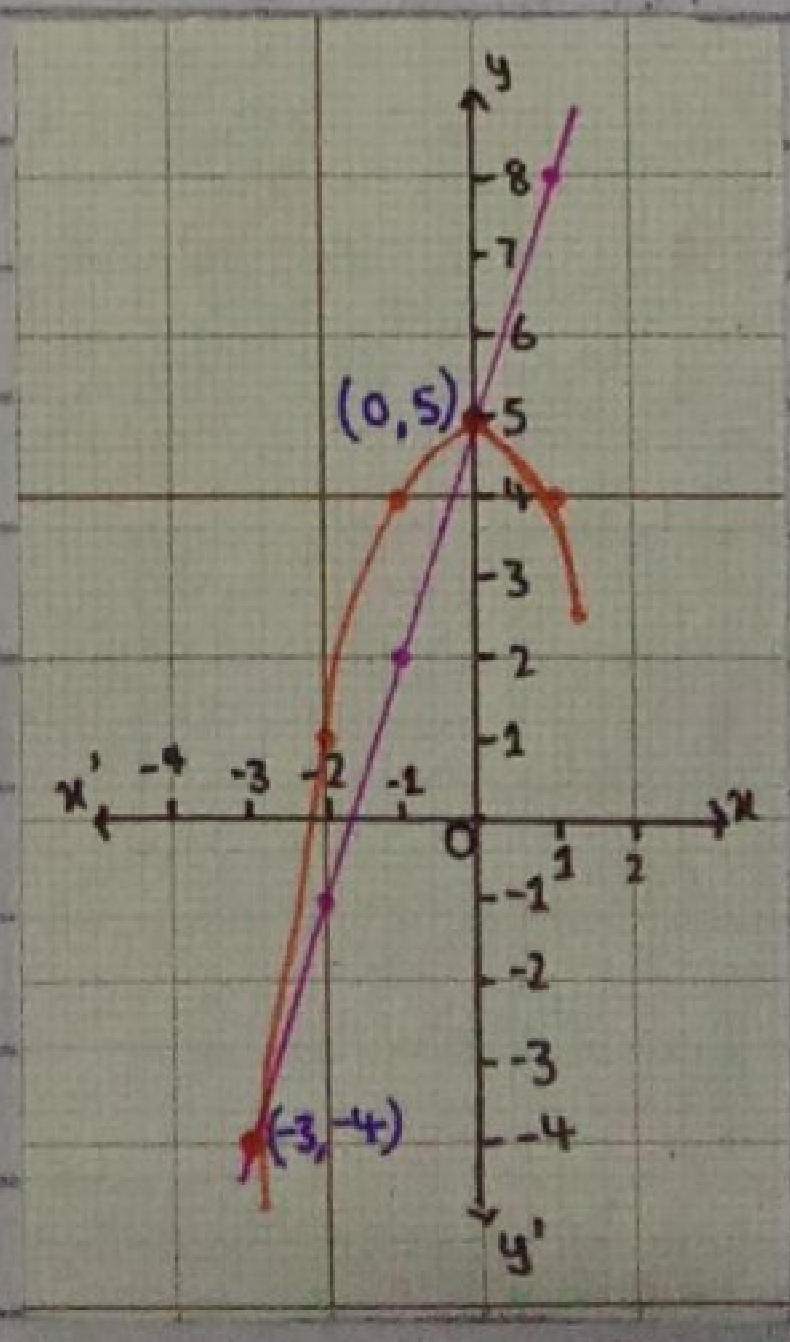
$y = -x^2+5$ — eq(ii)

Table for eq(i),

x	-3	-2	-1	0	1
y	-4	-1	2	5	8

Table for eq(ii),

x	-3	-2	-1	0	1
y	-4	1	4	5	4



Hence Answer is,
(0,5) & (-3,-4)

(iv) $f(x) = 1$; $g(x) = -2x^2+2x+5$

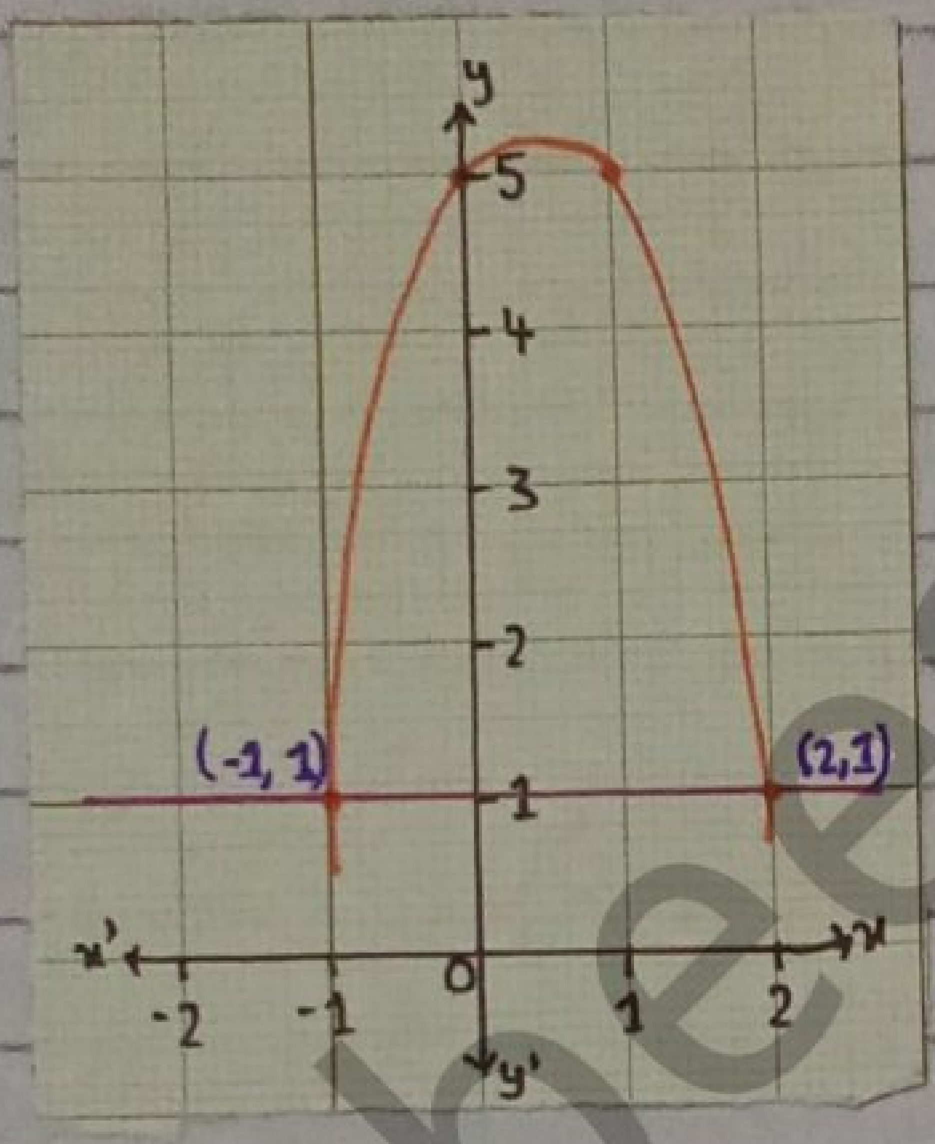
Let, $y = 1$ - eq(i)

$y = -2x^2+2x+5$ - eq(ii)

No Table for eq(i)

Table for eq(ii),

x		-1	0	1	2	
y		1	5	5	1	



Hence Answer is,
(-1, 1) & (2,1)

(v) $f(x) = 2+3x+x^2$; $g(x) = 5+3x-2x^2$

Let, $y = 2+3x+x^2$ - eq(i)

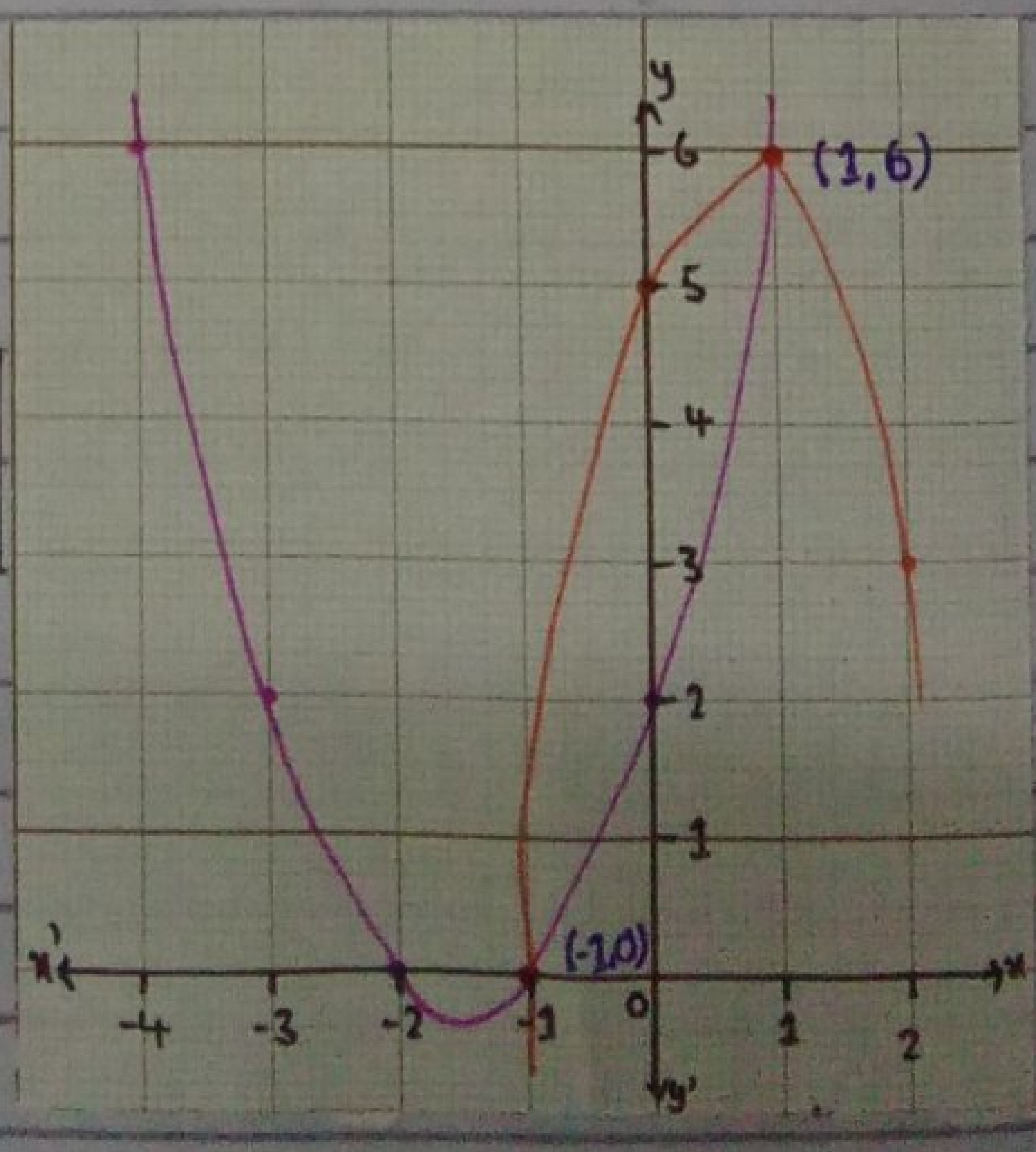
$y = 5+3x-2x^2$ - eq(ii)

Table for eq(i),

x	-4	-3	-2	-1	0	1
y	6	2	0	0	2	6

Table for eq(ii),

x		-1	0	1	2
y		0	5	6	3

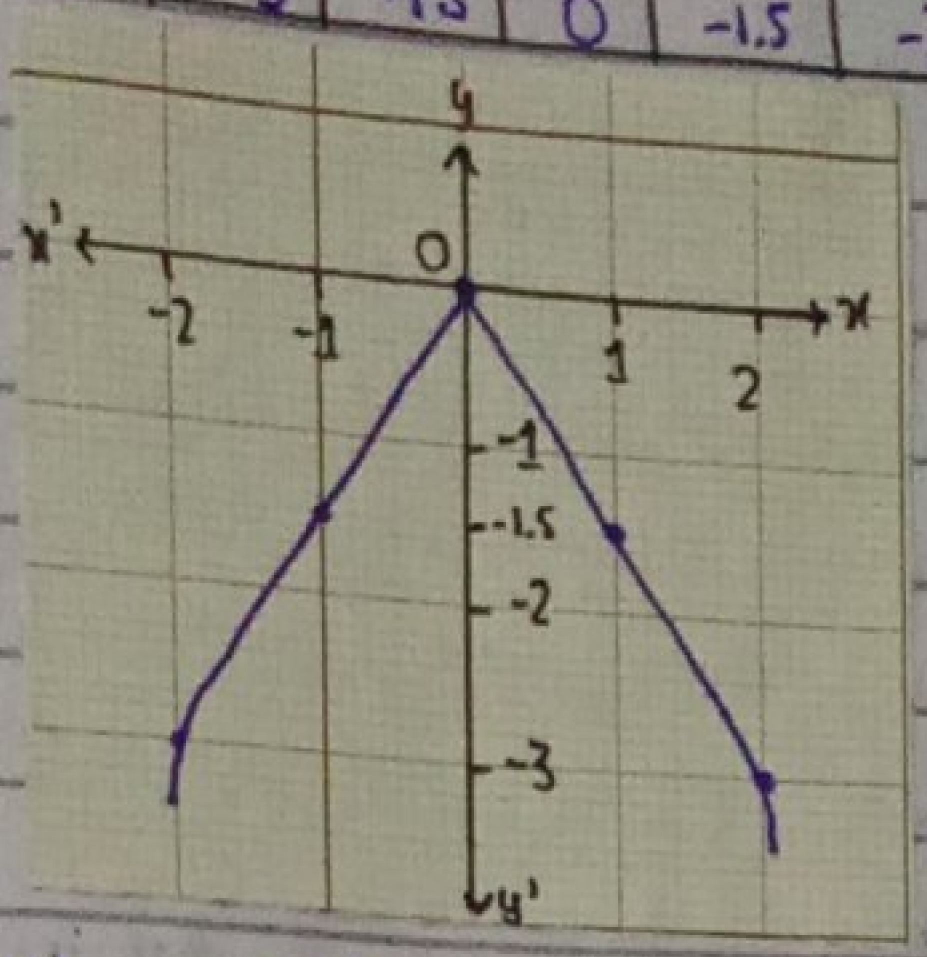


Hence Answer is,
(-1,0) & (1, 6)

6 Draw the graph of the following modulus functions.

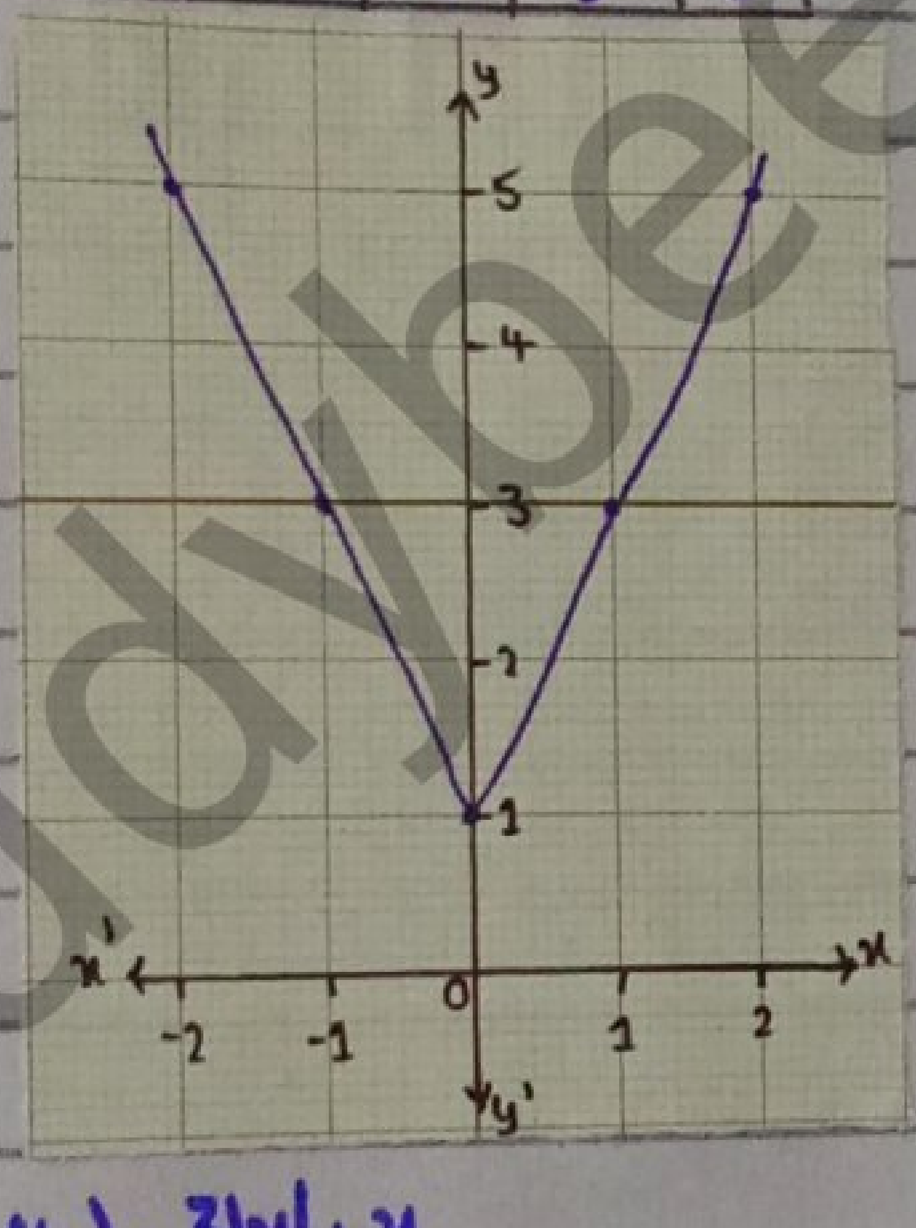
(i) $f(x) = -1.5|x|$

x	-2	-1	0	1	2
y	-3	-1.5	0	-1.5	-3



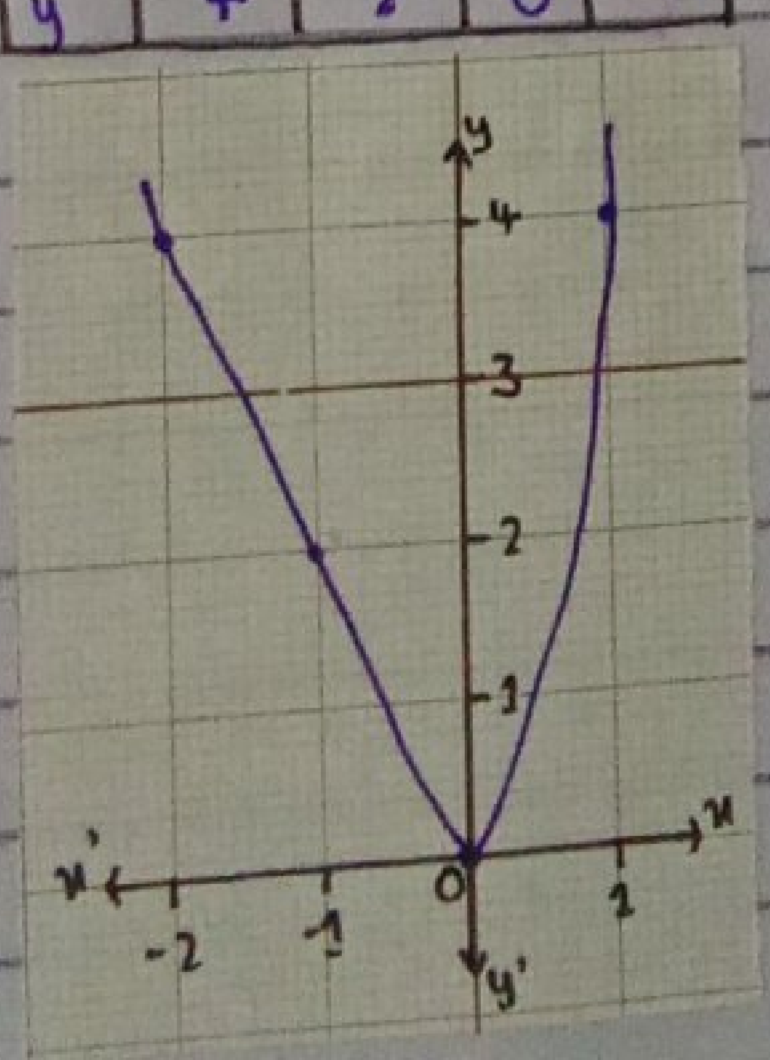
(ii) $f(x) = 1+2|x|$

x	-2	-1	0	1	2
y	5	3	1	3	5



(iii) $f(x) = 3|x| + x$

x	-2	-1	0	1
y	4	2	0	4



Q9 The equation for supply - - - - -

$S(x) = 2x+10$ – eq(i) ; $D(x) = -3x+40$ – eq(ii)

Condition: $S(x) = D(x)$

$(2x+10) = (-3x+40)$

$2x+3x = 40-10$

$\cancel{5}x = \cancel{30}^{6}$

$\boxed{x = 6}$

Putting $x=6$ in eq(i),

$S(x) = 2x+10$

$S(6) = 2(6)+10$

$S(6) = 12+10$

$S(6) = 22$

Putting $x=6$ in eq(ii),

$D(x) = -3x+40$

$D(6) = -3(6)+40$

$D(6) = -18+40$

$D(6) = 22$

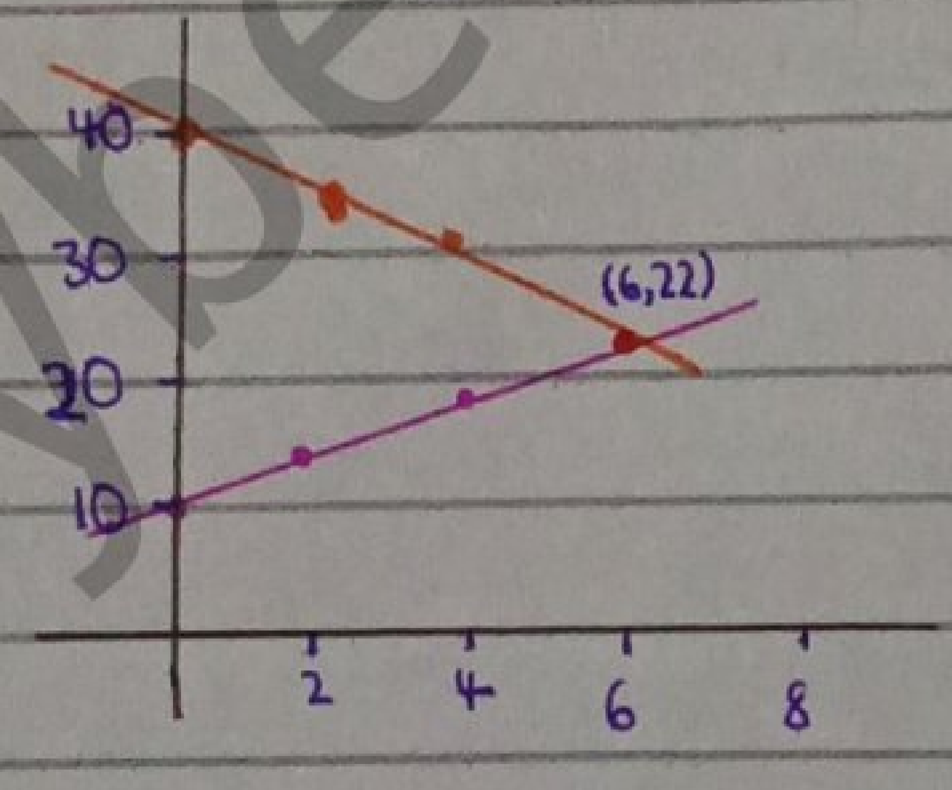
$\therefore$ $x=6$ is the point of equillibrium

Table for eq(i),

x	0	2	4	6
y	10	14	18	22

Table for eq(ii),

x	0	2	4	6
y	40	34	32	22



So (6,22) is the point of equilibrium

Q10 suppose a ball is thrown into - - - -

Let,

$h(t) = -6t^2+10t+5$ – eq(i) $h(t) = 9t$ – eq(ii)

let eq(i) = eq(ii)

$-6t^2+10t+5 = 9t$

$0 = 6t^2-10t+9t-5$

$a=6$, $b=-1$, $c=-5$

$$t = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$$

$$t = \frac{-(-1) \pm \sqrt{(-1)^2 - 4(6)(-5)}}{2(6)}$$

$$t = \frac{1 \pm \sqrt{1+120}}{12}$$

$$t = \frac{1 \pm \sqrt{121}}{12}$$

$$t = \frac{1 \pm 11}{12}$$

$t = \frac{1+11}{12}$	$t = \frac{1-11}{12}$
$t = \frac{12}{12}$	$t = \frac{-10}{12}$
$t = 1$	$t = \frac{-5}{6}$ in negative so not possible

Putting value of $t=1$ in eq(i),

$h(t) = 9t$

$h(1) = 9(1)$

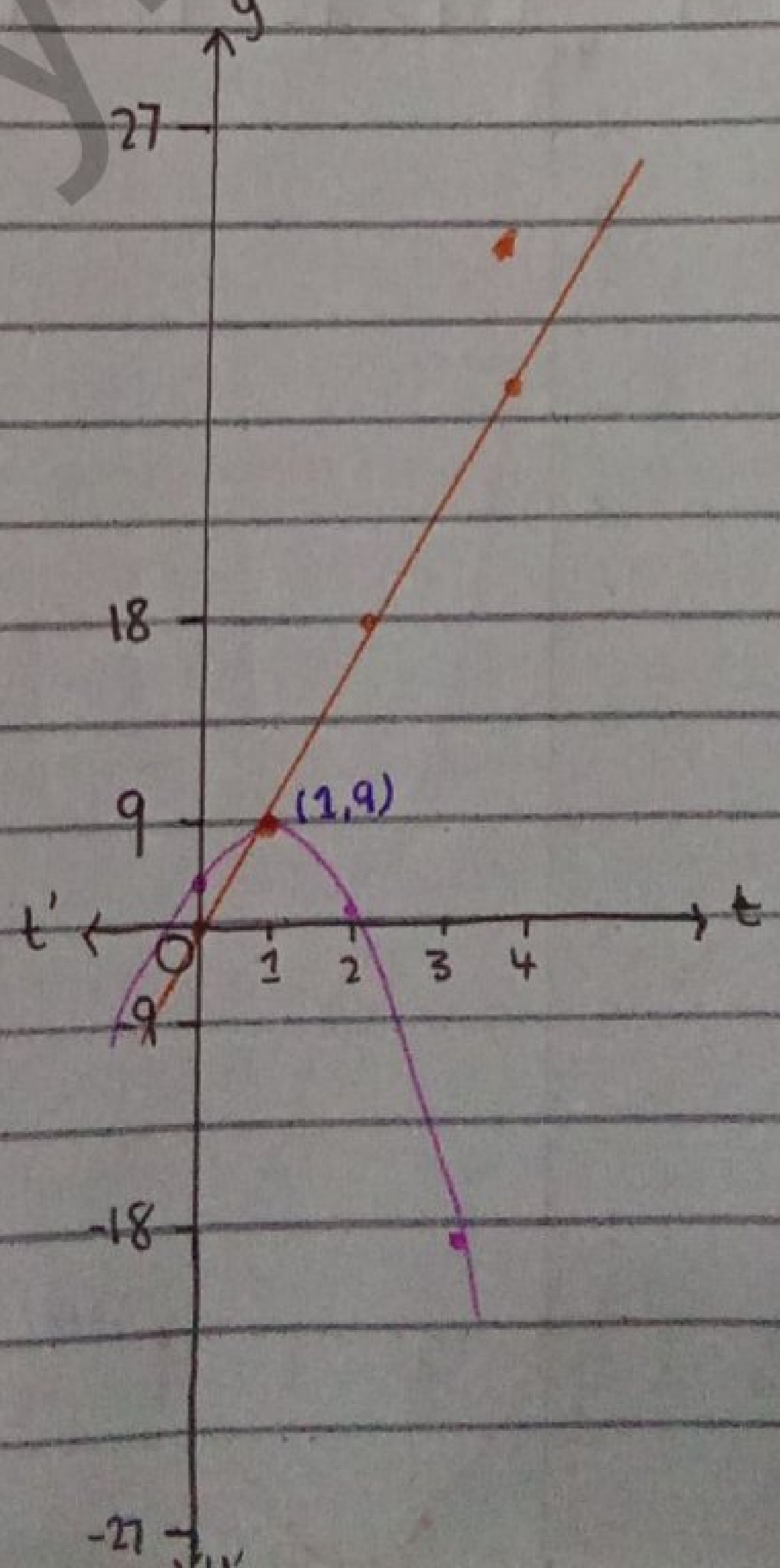
$\boxed{h(1) = 9\text{ m}}$

Table for eq(i),

t	0	1	2	3
y	5	9	1	-19

Table for eq(ii)

t	0	1	2	3
y	0	9	18	21



Hence ans
(1,9)

Q11 Two asteroids are following the - - - - -

if asked for "common point" then it means find the point of intersection

$f(x) = x^2 - 7x + 12$ — eq(i) $\quad$ $g(x) = x(x-3)$ — eq(ii)

Let,

$y = x^2 - 7x + 12$ — eq(iii) $\quad$ $y = x(x-3)$ — eq(iv)

Let eq(iii) = eq(iv)

$x^2 - 7x + 12 = x(x-3)$

$x^2 - 7x + 12 = x^2 - 3x$

$x^2 - x^2 - 7x + 3x + 12 = 0$

$-4x + 12 = 0$

$-4x = -12$

$x = 3$

Putting in eq(iv),

$y = x(x-3)$

$y = 3(3-3)$

$y = 3(0)$

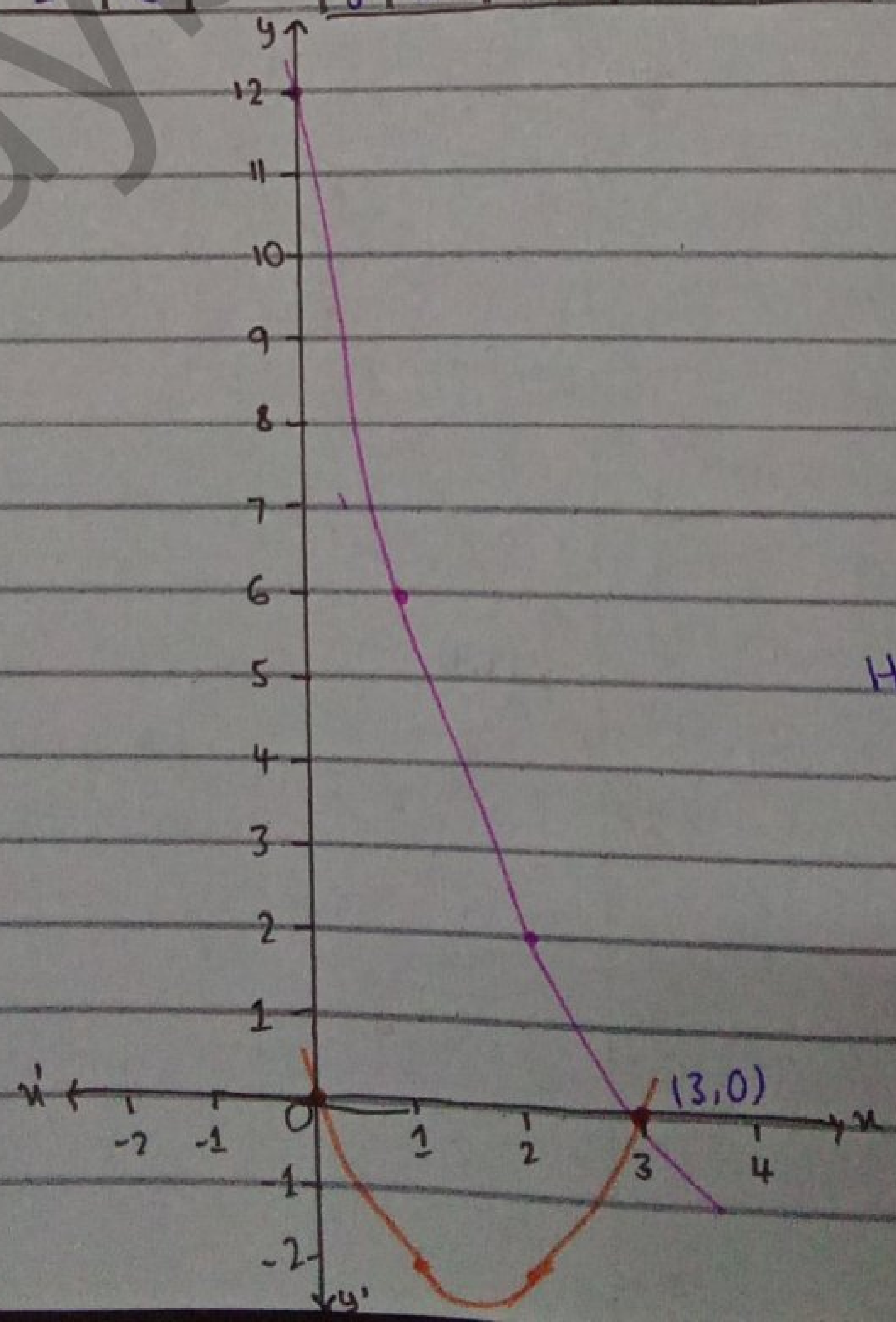
$y = 0$

Table for eq(i),

x	0	1	2	3
y	12	6	2	0

Table for eq(ii),

x	0	1	2	3
y	0	-2	-2	0



Hence ans (3,0)