Exercise 2.2

Q#1:- Find the point of intersection of the coordinate axes and linear functions graphically:-

(i) $y = -5x + 10$ ——— (i)

put $x = -1, 0, 1, 2$ in Eq(i)

$y = -5(-1) + 10 \Rightarrow 15$

$(-1, 15)$

$y = -5(0) + 10 \Rightarrow 10$

$(0, 10)$

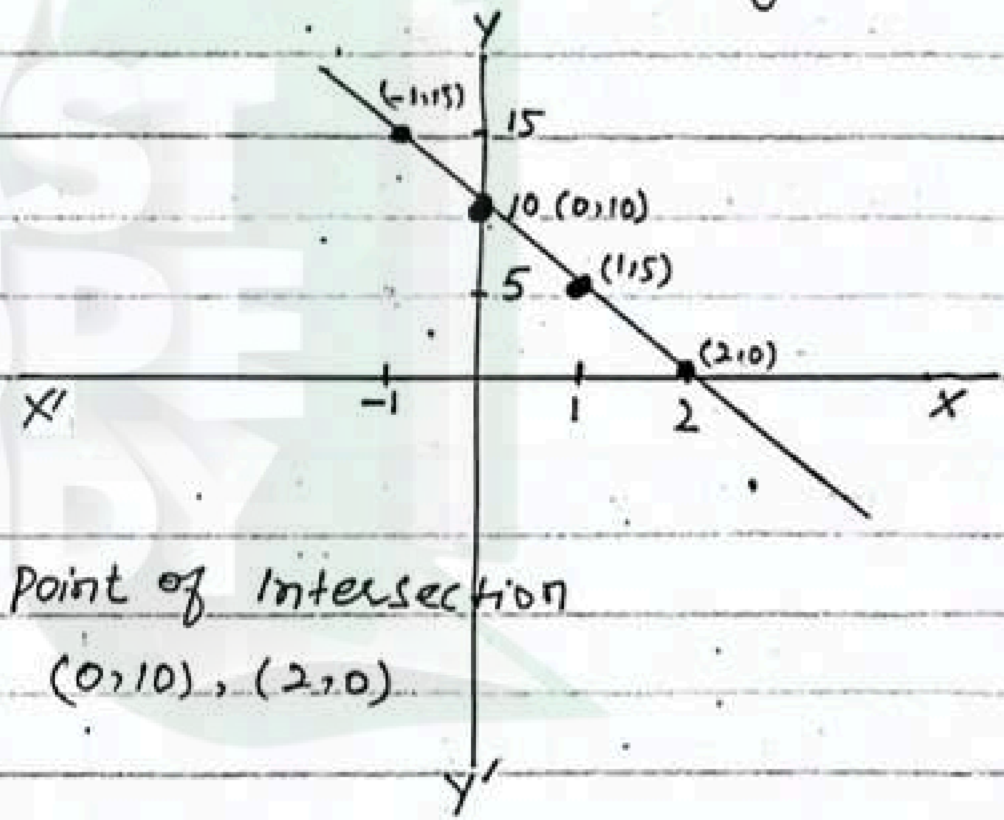
$y = -5(1) + 10 \Rightarrow 5$

$y = -5(2) + 10 = 0$

$(2, 0)$

x	-1	0	1	2
y	15	10	5	0

Graph of a function $y = -5x + 10$



Point of Intersection

$(0, 10)$, $(2, 0)$

$y = 3x + 3/2\, x$

x	0	1	2	$-1/2$
y	1.5	4.5	7.5	0

(iv) $y = 3x + \frac{3}{2}$ —— (i)

put $x = 0, 1, 2, -\frac{1}{2}$ in (i)

$y = 3(0) + \frac{3}{2} = \frac{3}{2} \Rightarrow 1.5$

$y = 3(1) + \frac{3}{2} \Rightarrow \frac{6+3}{2}$

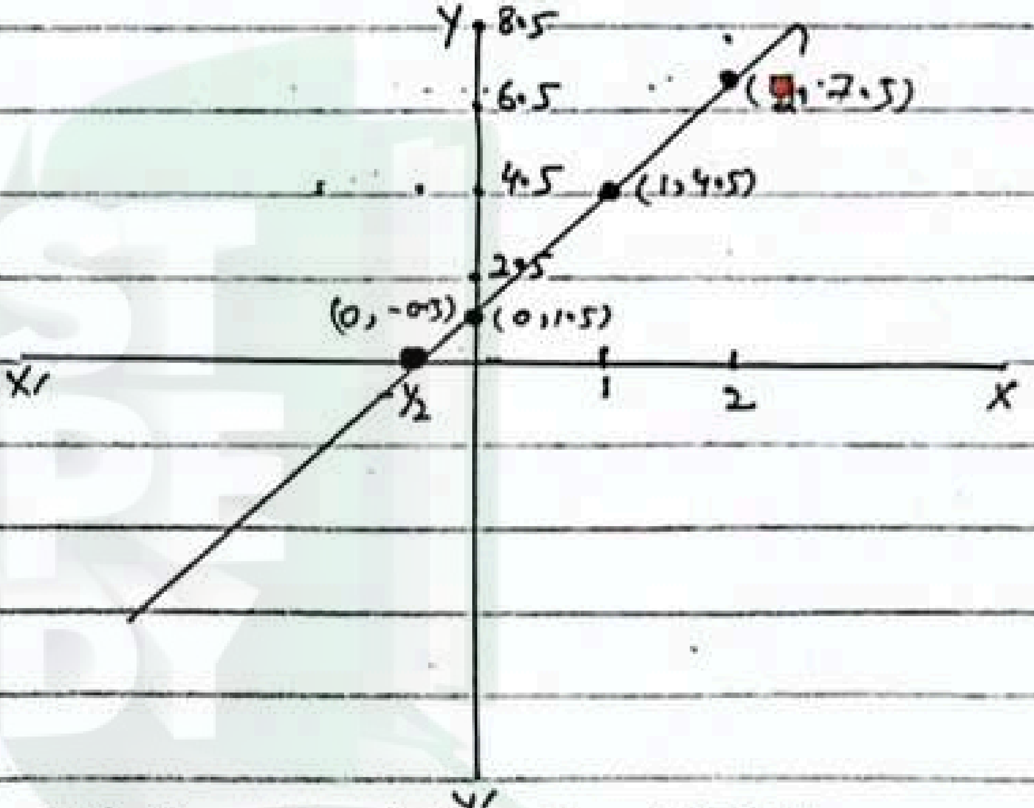
$y = \frac{9}{2} \Rightarrow 4.5$

$y = 3(2) + \frac{3}{2} \Rightarrow \frac{12+3}{2}$

$y = \frac{15}{2} = 7.5$

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

$y = 0$



points of intersections

$(0, 1.5)$ and $(0, -0.5)$

Q#2:- Find the point(s) of intersection of functions graphically:-

(i) $f(x) = 2x+5$, $g(x) = -x+5$

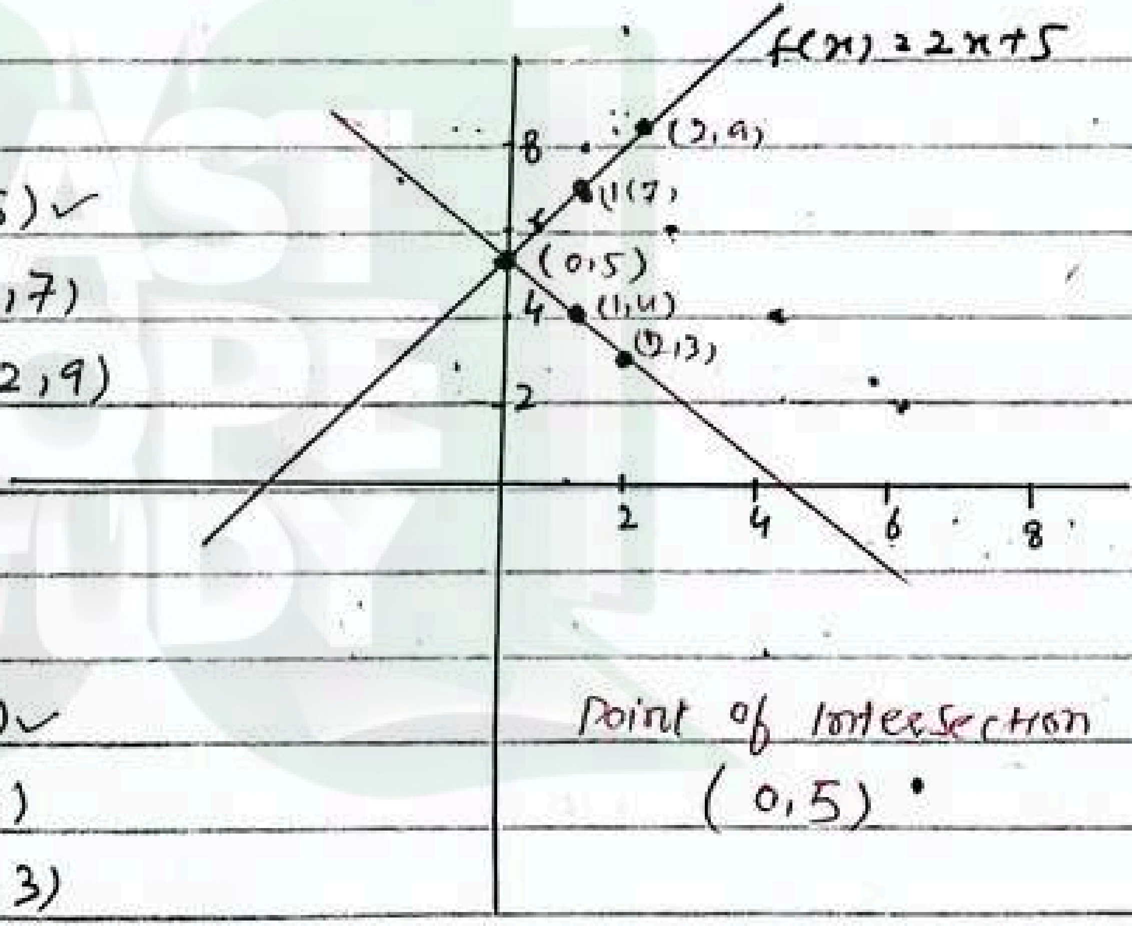
$f(x) = 2x+5$

put $x = 0, 1, 2$

$f(0) = 2(0)+5 = 5$ $(0,5)$ ✓

$f(1) = 2(1)+5 = 7$ $(1,7)$

$f(2) = 2(2)+5 = 9$ $(2,9)$



$g(x) = -x+5$

put $x = 0, 1, 2$

$g(0) = -0+5 = 5$ $(0,5)$ ✓

$g(1) = -1+5 = 4$ $(1,4)$

$g(2) = -2+5 = 3$ $(2,3)$

Point of Intersection

$(0,5)$

(viii) $f(x) = -x^2 - 3x + 2 \quad g(x) = x + 6$

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

put $x = -2, -1, 0$

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

$= -4 + 6 + 2 = 4$

$(-2, 4)$ ✓

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

$(0, 2)$

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

$-1 + 3 + 2 = 4$

$(-1, 4)$

NOW $g(x) = x + 6$

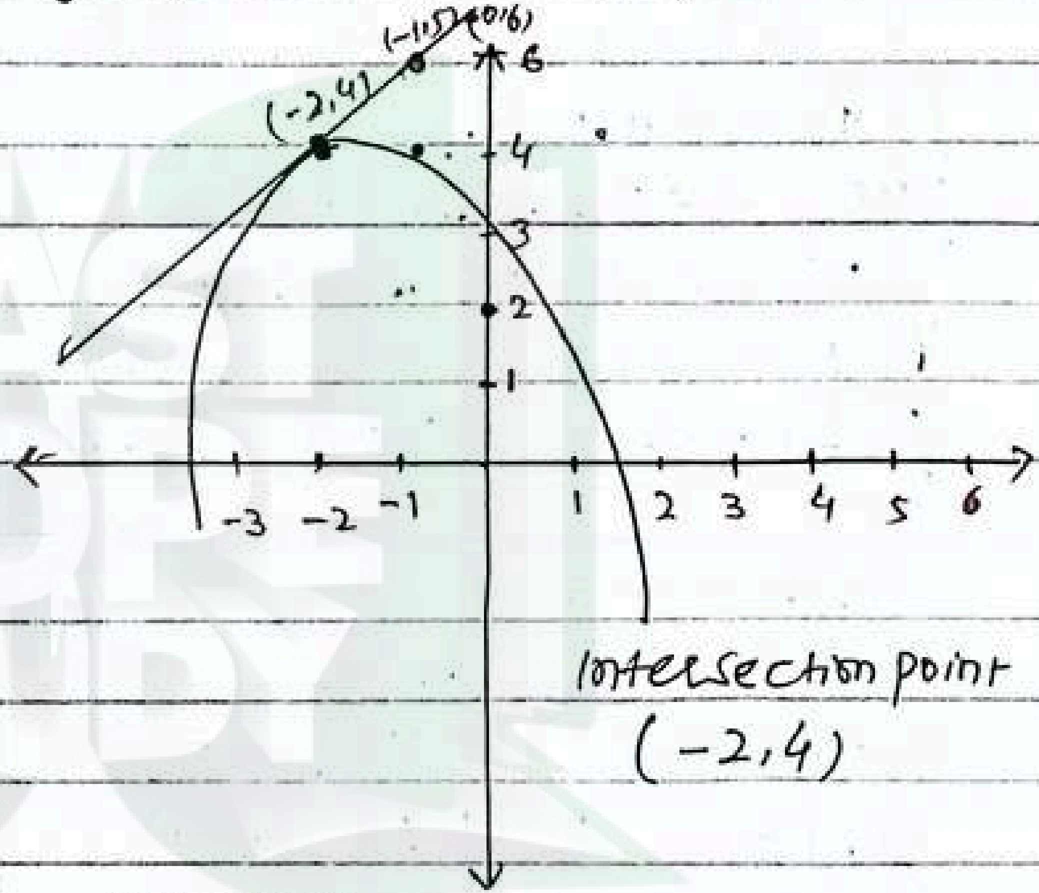
put $x = -2, -1, 0$

$g(-2) = -2 + 6 = 4$

$(-2, 4)$ ✓

$g(-1) = -1 + 6 = 5 \; ; \; (-1, 5)$

$g(0) = 0 + 6 = 6 \; ; \; (0, 6)$



Intersection point

$(-2, 4)$

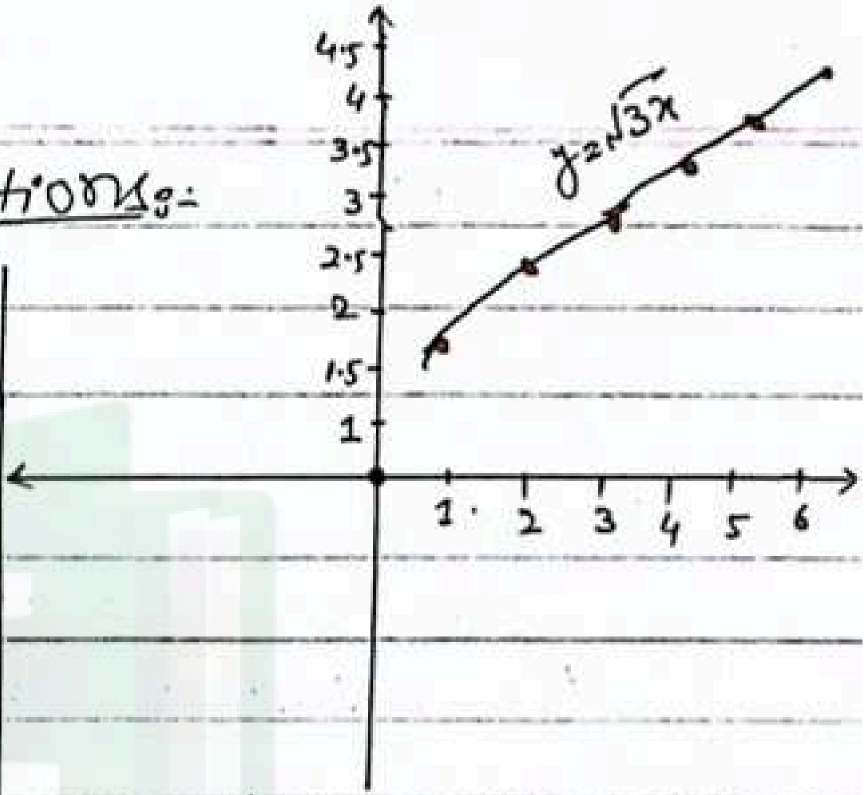
put $x = -3$

$f(-3) = -(-3)^2 - 3(-3) + 2 \Rightarrow -9$

Q#3 Graph the following functions:-

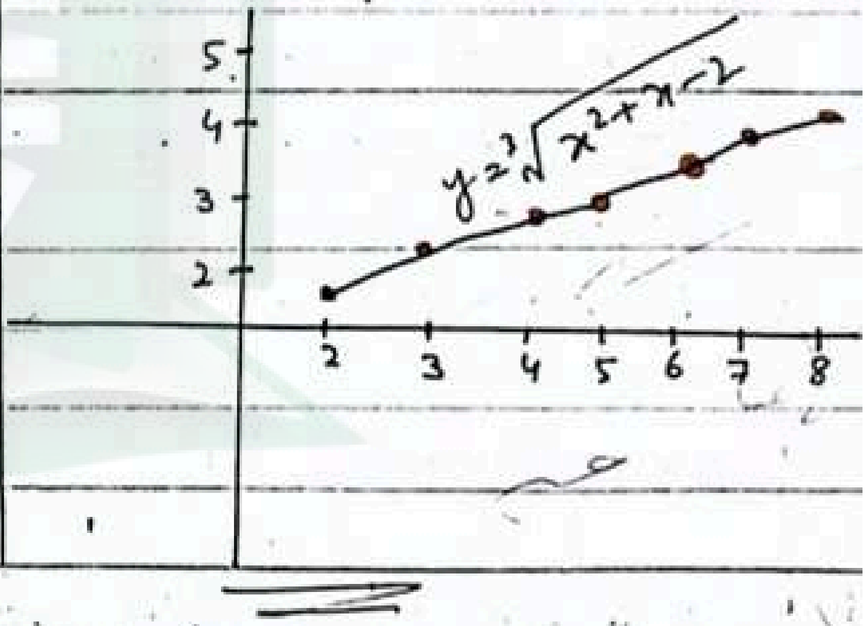
(i) $y = \sqrt{3x}$

x	0	1	2	3	4	5	6
y	0	1.7	2.4	3	3.5	3.9	4.2



(vii) $y = \sqrt[3]{x^2 + x - 2}$

x	2	3	4	5	6	7	8
y	1.3	2.2	2.6	3	3.4	3.8	4.1



Q#4 A building's height over time is modeled by $H(t) = 100 + 20t$. Which is in meters and t is the time in months. The height of a growing tree nearby is given by $T(t) = 50 + 10t + t^2$.

(i) At What time will the building and tree have the same height?

if the height is same then $H(t) = T(t)$

$$100 + 20t = 50 + 10t + t^2$$

$$t^2 + 10t + 50 - 100 - 20t = 0$$

$$t^2 - 10t - 50 = 0$$

$a = 1 \quad b = -10 \quad c = -50$

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

$$t = \frac{-(-10) \pm \sqrt{(-10)^2 - 4(1)(-50)}}{2(1)}$$

$$t = \frac{10 \pm \sqrt{100 + 200}}{2} \Rightarrow \frac{10 \pm \sqrt{300}}{2}$$

$$t = \frac{10 \pm 10\sqrt{3}}{2} \Rightarrow \frac{\cancel{2}(5 \pm 5\sqrt{3})}{\cancel{2}}$$

$$t = 5 \pm 8.66 \Rightarrow t = 5 + 8.66 \Rightarrow 13.66$$

$$\boxed{t = 14}$$

(ii) What will that height be?

put $t=4$ in $H(t) = 100+20t$

$H(14) = 100+20(14) \Rightarrow 100+280$

$H(14) = 380m$

$H(t) = 100+20t$

$H(4) = 100+20(4)$

$= 180 \quad (4, 180)$

$t = 8$

$H(8) = 100+20(8) = 260$

$(8, 260)$