

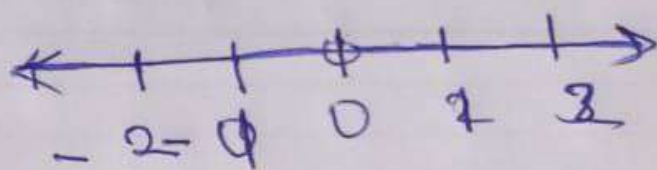
9. $\frac{x+1}{x+1} \geq \frac{1}{x+5} (x+1)$

$$x+5 \geq \frac{x+1}{x+5} \times x+5$$

$$x+5 \geq x+1$$

$$x+4 \geq x$$

Any number can satisfy.

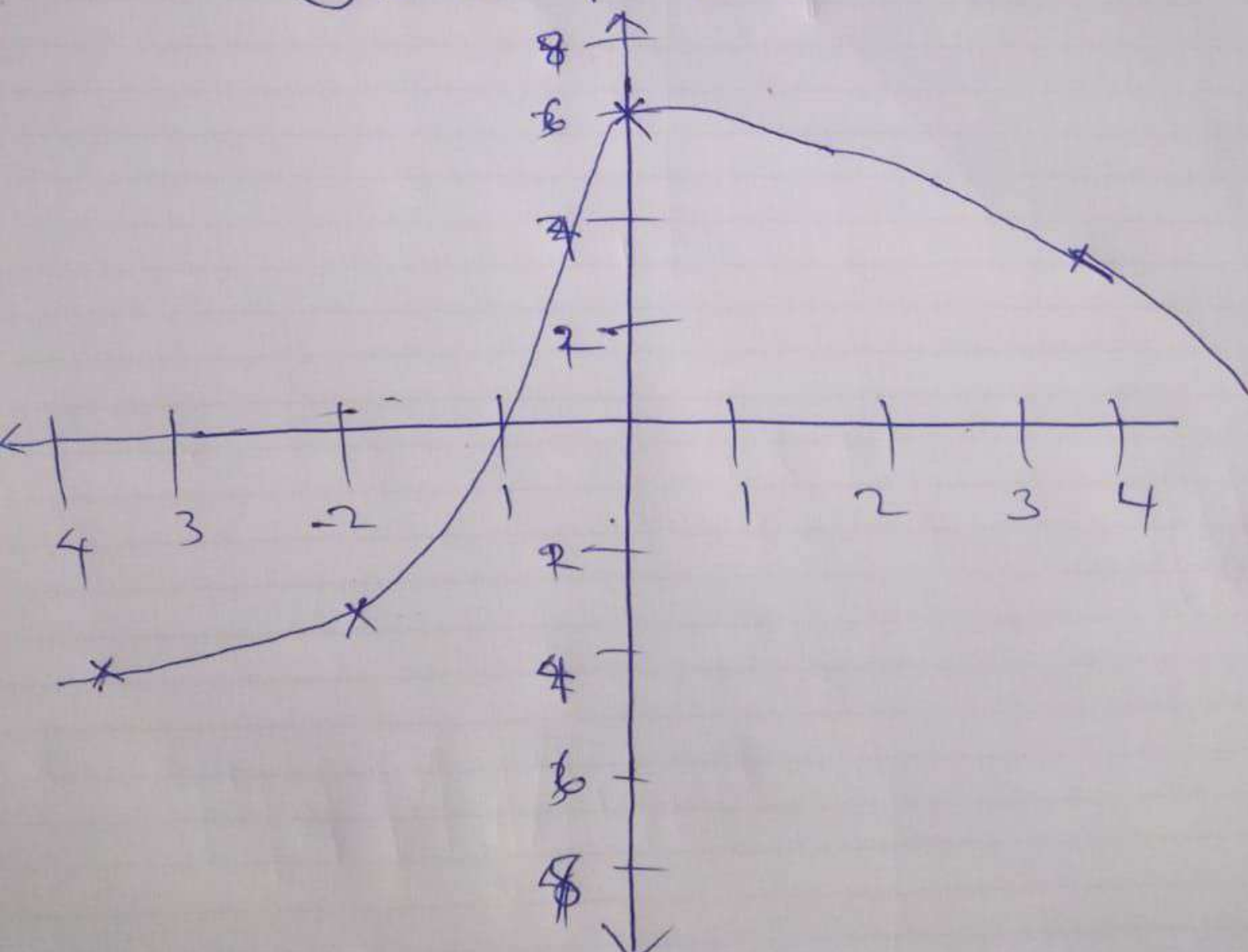


7. $f(x) = \frac{x^2 + 3x^2 - 4x - 12}{x^2 - x - 2}$

$g = \frac{x^2 + 3x^2 + 4x - 12}{x^2 - x - 2}$

x	-4	-2	0	2	4	6
y	-3.4	6	6	2		

x	-4	-2	0	2	4
y	3.8	3	6	7	3.6

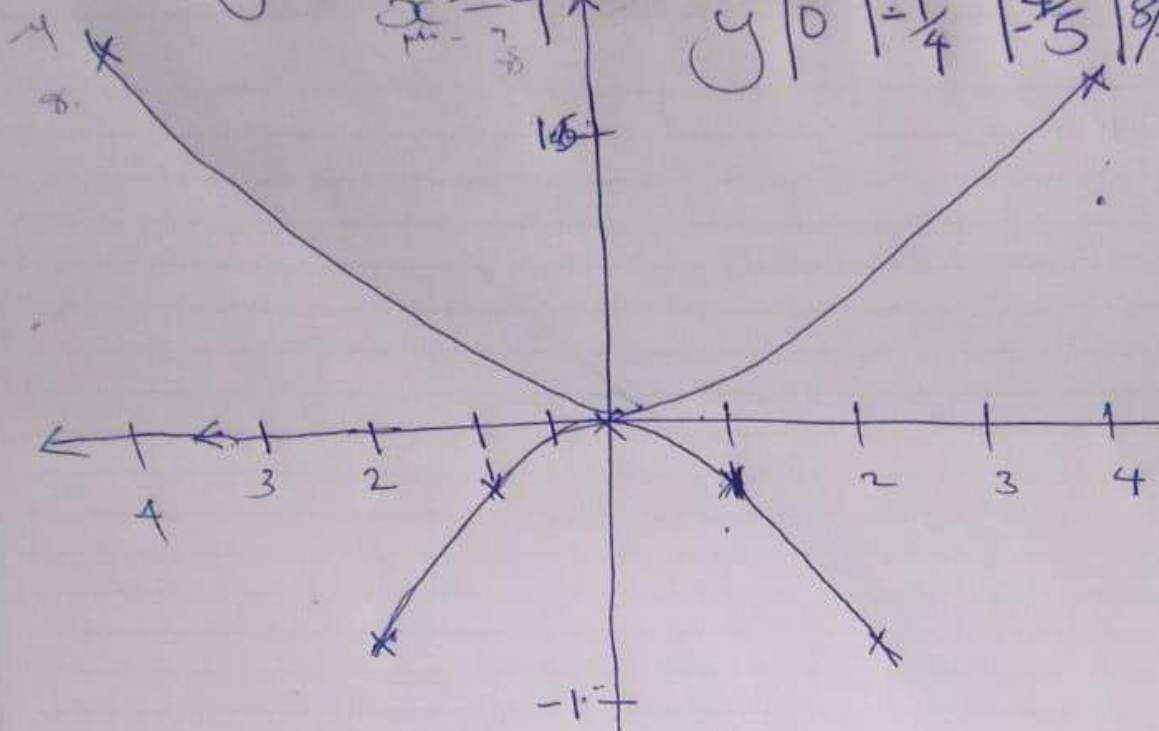


25. $P(x) = \frac{2x}{x^2 - 9}$

x	-4	-2	1
y		$-\frac{4}{5}$	$-\frac{1}{4}$

$y = \frac{2x}{x^2 - 9}$

x	0	1	2	4
y	0	$-\frac{1}{4}$	$-\frac{4}{5}$	$\frac{8}{7}$

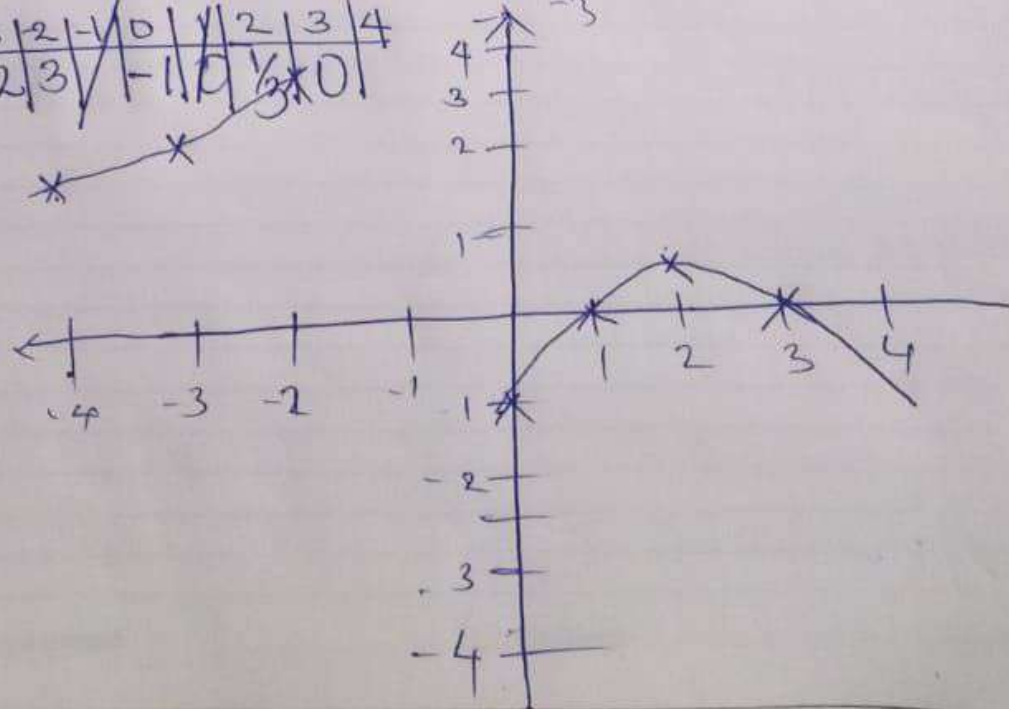


26. $f(x) = \frac{x^2 - 4x + 3}{x^2 - 2x - 3}$

x	4	2	0	2	4
y	$\frac{3}{5}$	$\frac{1}{3}$	$\frac{1}{3}$	$\frac{1}{3}$	

$y = \frac{x^2 - 4x + 3}{x^2 - 2x - 3}$

x	4	3	2	1	0	1	2	3	4
y	$\frac{5}{3}$	$\frac{2}{3}$	$\frac{3}{4}$	$-\frac{1}{4}$	0	$\frac{1}{3}$	$\frac{1}{3}$	0	



11. (a) $f \cdot g$ and (b) $g \cdot f$

$$11. f(x) = 2x^2$$

$$2x^2 \cdot \sqrt{x+6}$$

$$g(x) = \sqrt{x+6}$$

$$x = 2y^2 \cdot \sqrt{y+6}$$

$$f \cdot g = f(x) \cdot g(x)$$

$$2y^2 = \frac{x}{(\sqrt{y+6})^2}$$

$$y = \sqrt{\frac{x}{(\sqrt{y+6})^2}}$$

$$\text{Domain } \left\{ x \mid x \sqrt{\frac{x}{(\sqrt{y+6})^2}} \right\}$$

$g \cdot f$ is the same since it's multiple.

$$12. f(x) = x - 2$$

$$g(x) = |x|$$

$$f \cdot g = f(x) \cdot g(x) \quad (x-2)x \quad x = y(y-2)$$

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

$$x^2 - 2x$$

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

$$\text{Domain} = \left\{ x \mid x \text{ Any real number} \right\}$$

$$\text{Domain} = \left\{ x \mid x \frac{x-2}{y} \right\}$$

$$g \cdot f \quad |x| (x-2) \quad y = x^2 - 2x$$

$$x (x-2) \quad x = \frac{x-2}{y} \quad \text{Domain } \left\{ x \mid x \frac{x-2}{y} \right\}$$

3. $y = \sqrt[3]{x}$

x	8	27	64
y	2	3	4

(a) $r(x) = \frac{1}{2} \sqrt[3]{x}$

The graph $r(x)$ value of y-axis is halved as the x-axis progresses. It deflects downwards.

(b) $h(x) = \sqrt[3]{x} + 2$

The graph function $h(x)$

y-axis values grow by addition of two compared to $y = \sqrt[3]{x}$. It deflects upwards.

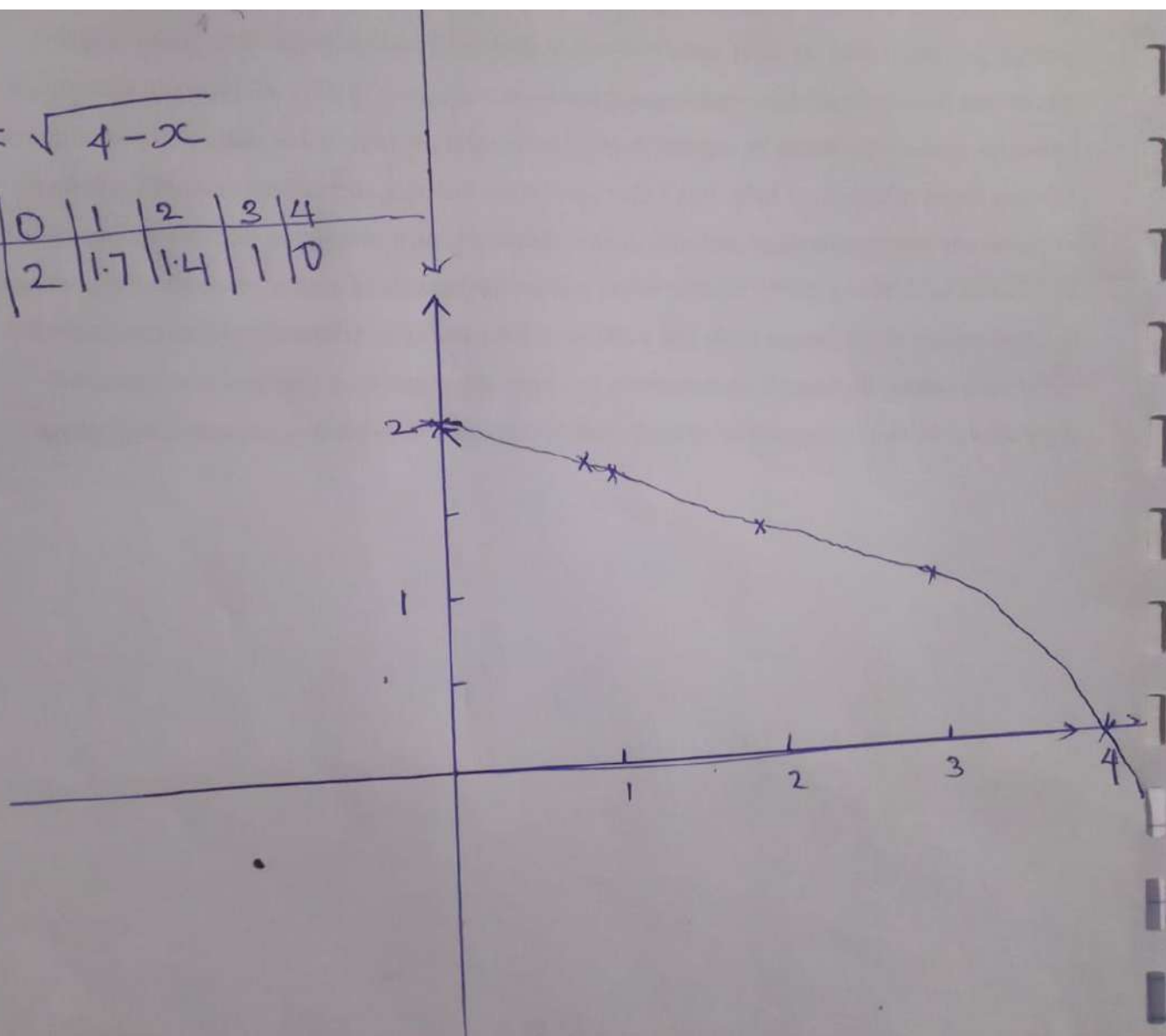
(c) $g(x) = \sqrt[3]{x+2}$

The graph function $g(x)$

the x-axis values are increased by 2 then evaluated as a whole to the cube root. It deflects upwards.

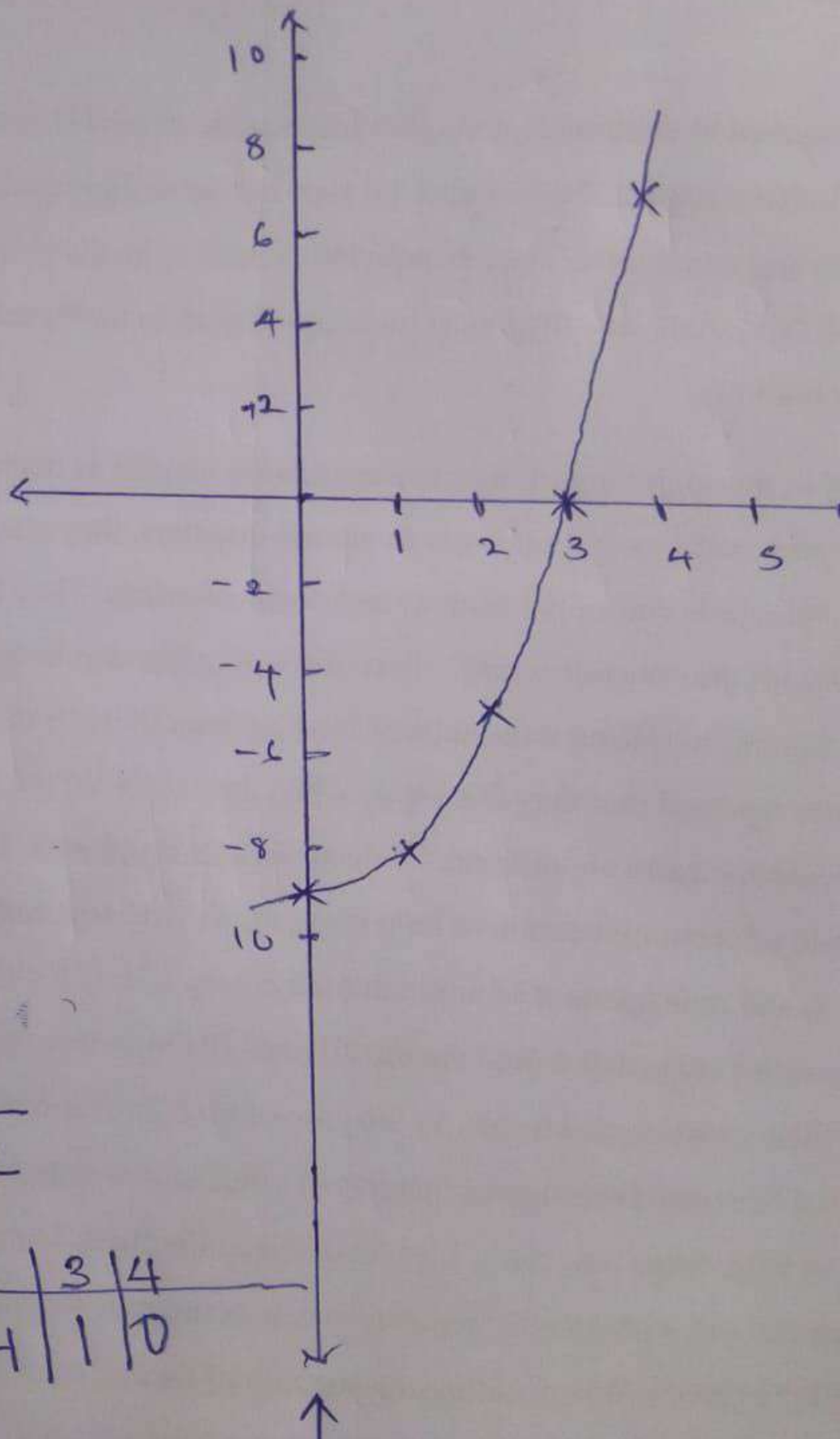
4. $y = \sqrt{4-x}$

X	0	1	2	3	4
y	2	1.7	1.4	1	0



3. $y = x^2 - 9$

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



4. $y = \sqrt{4 - x}$

X	0	1	2	3	4
y	2	1.7	1.4	1	0

$$17. f(t) = \frac{1}{4}t(t-2)^2$$

let t be $x - x - a(x)$

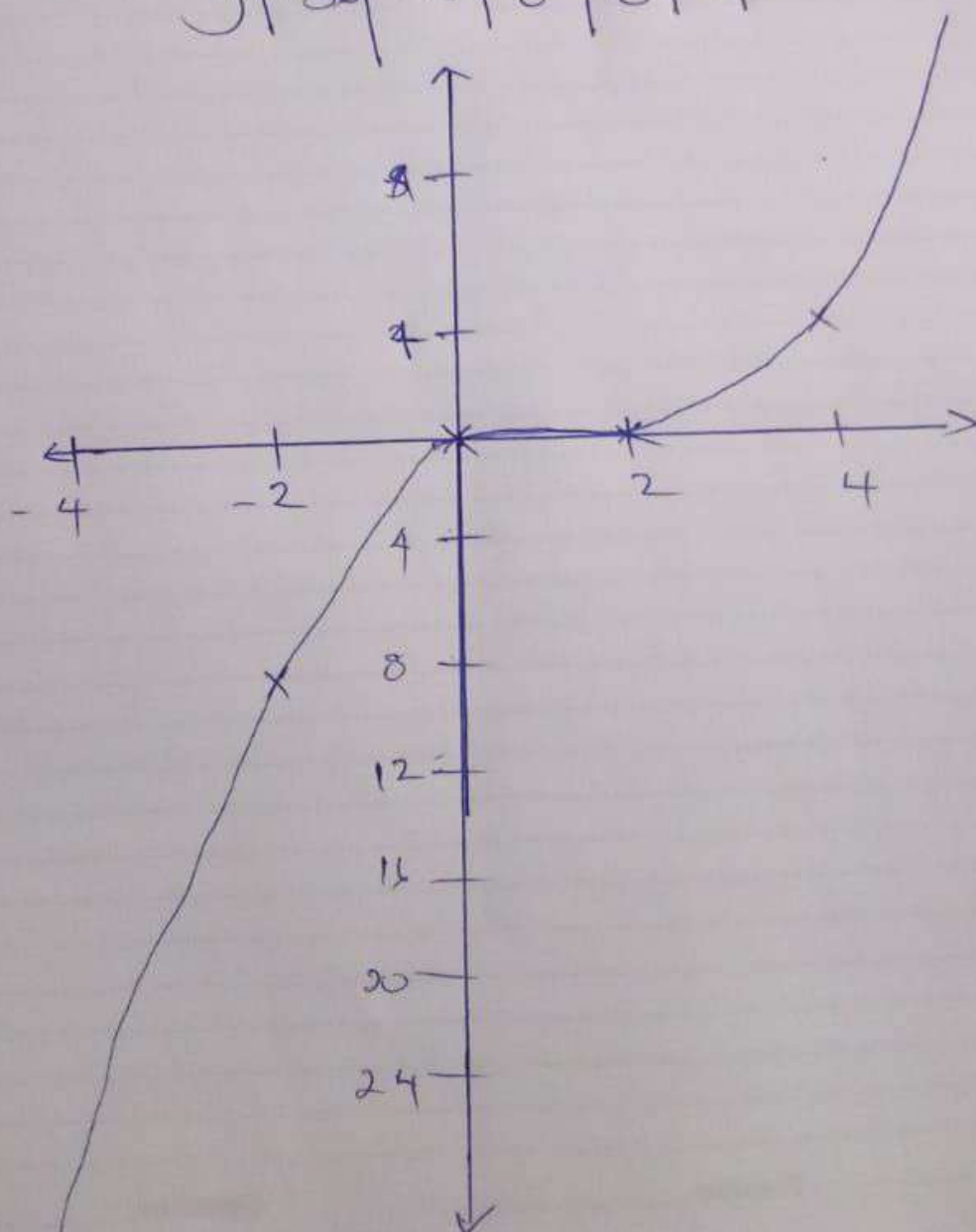
$$y = \frac{1}{4}x(x-2)^2$$

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

$$y = \frac{x^3}{4} - x^2 + x$$

x	0	1	2	4
y	0	$\frac{1}{4}$	0	4

x	-4	-2	0	2	4
y	-36	-8	0	0	4



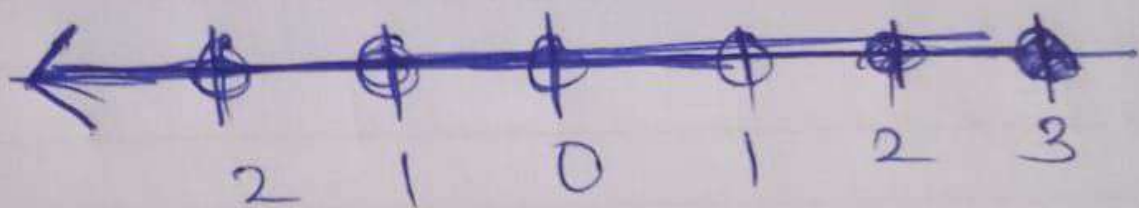
28. $3x^3 - 12x \leq 0$

$$\frac{\cancel{3}x^3}{\cancel{3}} \leq \frac{\cancel{12}x}{\cancel{3}}$$

$$\frac{x^3}{x} \leq \frac{4\cancel{x}}{\cancel{x}}$$

$$x^2 \leq 4$$

$$x \leq 2$$



19. $f(x) = x^3 + 2x^2 + 4x + 8$

Factors of the constant term

$\pm 1, \pm 2, \pm 4, \pm 8$

Factors of the leading Coeff. ± 1

$\frac{p}{q} : \frac{\pm 1}{1} \frac{\pm 2}{1} \frac{\pm 4}{1} \frac{\pm 8}{1}$

$\pm 1, \pm 2, \pm 4, \pm 8$

$$\begin{array}{r|rrrr} 1 & 1 & 2 & 4 & 8 \\ & \downarrow & & & \\ & 1 & 3 & 7 & 15 \end{array}$$

Remainder 15: Not zero

$$\begin{array}{r|rrrr} -1 & 1 & 2 & 4 & 8 \\ & \downarrow & & & \\ & 1 & 1 & 3 & 5 \end{array}$$

Rem 5 Not a zero.

$$\begin{array}{r|rrrr} 2 & 1 & 2 & 4 & 8 \\ & & 2 & 8 & 24 \\ \hline & 1 & 4 & 12 & 32 \end{array}$$

$$\begin{array}{r|rrrr} -2 & 1 & 2 & 4 & 8 \\ & & -2 & 0 & -8 \\ \hline & 1 & 0 & 4 & 0 \end{array}$$

Rem 0 is a zero

$$\begin{array}{r|rrrr} 4 & 1 & 2 & 4 & 8 \\ & & 4 & 24 & 42 \\ \hline & 1 & 6 & 28 & 120 \end{array}$$

$$10. f(x) = \sqrt{x-1}$$

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

$$(a) (f+g)(x) = f(x) + g(x)$$

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

$$\sqrt{x-1} + x^2 + 1$$

$$(b) (g-f)(x)$$

$$x^2 + 1 - \sqrt{x-1}$$

$$g(x) - f(x)$$

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

$$(c) (fg)(x)$$

$$f(x) \cdot g(x)$$

$$\sqrt{x-1} \cdot (x^2 + 1)$$

$$x^2 \sqrt{x-1} + \sqrt{x-1}$$

$$2(\sqrt{x-1})(x^2)$$

$$(d) (f/g)(x)$$

$$f(x)/g(x)$$

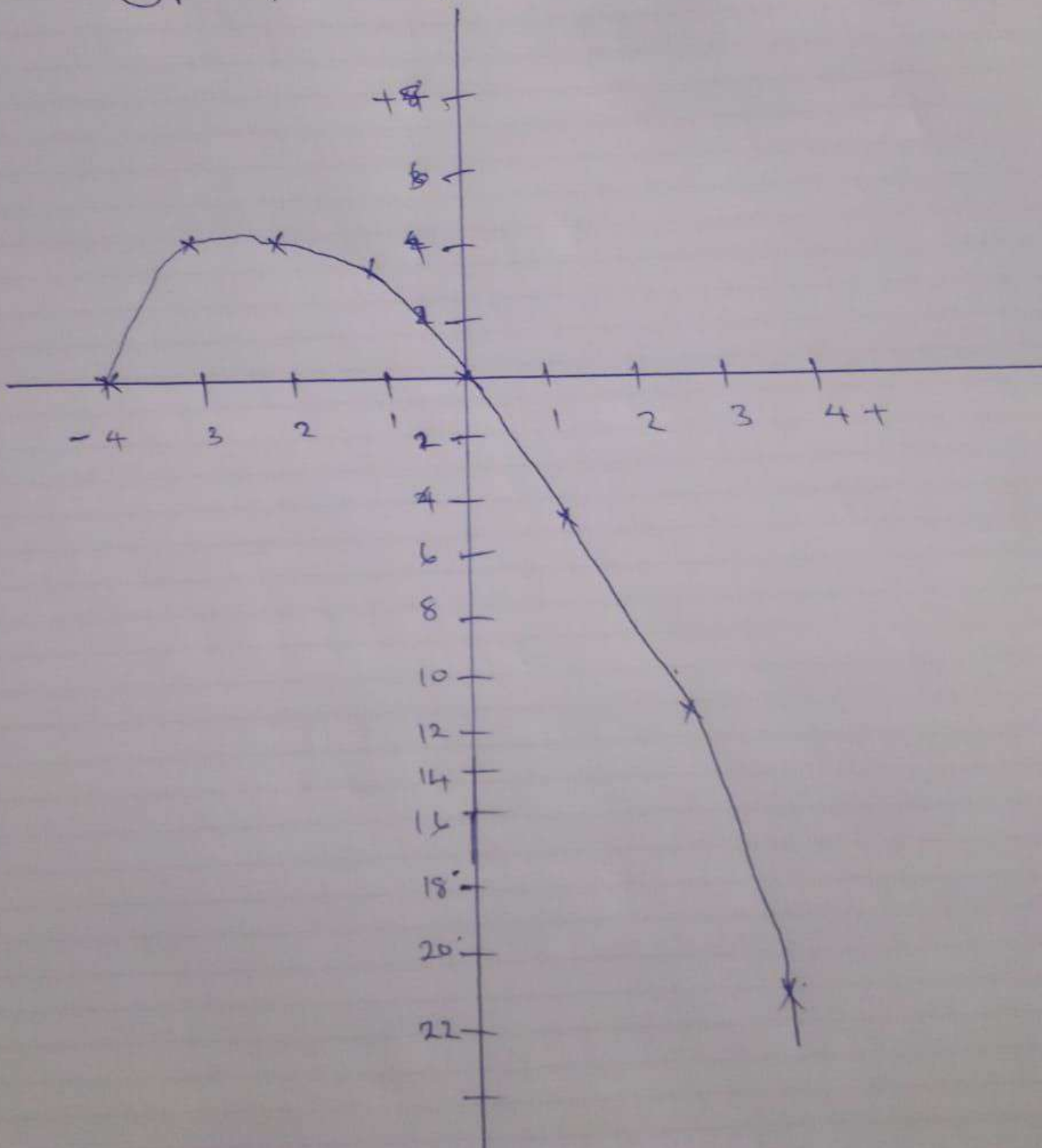
$$\frac{(x-1)}{(x^2 + 1)}$$

$$\frac{\cancel{x-1}}{(x+1)(\cancel{x-1})} = \frac{1}{x+1}$$

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

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

x	-4	-3	-2	-1	0	1	2	3
y	0	4	4	-3	0	-5	-12	-21



22. $6x^3 - 4x^2$ by $2x^2 + 1$

$$\begin{array}{r}
 3x + 2 \\
 \hline
 2x^2 + 1 \overline{) 6x^3 + 4x^2 + 0x} \\
 \underline{-6x^3 + 3x} \\
 4x^2 - 3x \\
 \underline{4x^2 + 2} \\
 \hline
 -3x + 2 \\
 \hline
 \text{Rem}
 \end{array}$$

23. $2x^4 + 3x^3 - 6x + 5$ by $x + 2$

$$\begin{aligned}
 x + 2 &= 0 \\
 x &= -2
 \end{aligned}$$

$$\begin{array}{r|rrrr}
 -2 & 2 & 3 & -6 & 5 \\
 & \downarrow & -4 & 2 & 8 \\
 \hline
 & 2 & -1 & -4 & 13 \\
 & & & & \text{Rem}
 \end{array}$$

Sol = $2x^3 - x^2 - 4 + \frac{13}{x+2}$

5. Eq. of a line $(-\frac{1}{2}, 1)$ and $(3, 8)$
 (x_1, y_1) (x_2, y_2)

$$y = mx + c$$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{8 - 1}{3 - (-\frac{1}{2})} = \frac{7}{3\frac{1}{2}} = \frac{7}{\frac{7}{2}} = 2$$

$$y = 2x + c \quad (3, 8) \quad 8 = 2(3) + c$$

$$8 = 6 + c$$

$$2 = c$$

$$\underline{\underline{y = 2x + 2}}$$

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

(a) $f(6)$
 $x=6 \quad \frac{6}{6-2} = \frac{6}{4} = \underline{\underline{\frac{3}{2}}}$

(b) $f(2)$
 $x=2 \quad \frac{2}{2-2} = \frac{2}{0}$ Not feasible
Not possible

(c) $f(s+2)$
 $x=s+2 \quad \frac{s+2}{s+2-2} = \frac{s+2}{s}$

$$13. \quad h(x) = 5x - 2$$

$$h(x)^{-1} =$$

$$x = 5y - 2$$

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

$$h(x)^{-1} = \underline{\underline{\frac{x+2}{5}}}$$

$$15. \quad (-8, 5) \quad (-4, 7)$$

$$y = ax^2 + bx + c$$

$$f(x) = a(x-h)^2 + k$$

$$y = a(x+8)^2 + 5$$

$$-7 = a(-4+8)^2 + 5$$

$$-7 = a(4)^2 + 5$$

$$\frac{-12}{16} = \frac{3}{4} = \frac{16}{16}a$$

$$a = -3/4$$

$$y = a(x+8)^2 + 5$$

$$y = -3/4(x+8)^2 + 5$$

$$y = -3/4(x^2 + 16x + 64) + 5$$

$$y = -3/4x^2 - 12x - 148 + 5$$

$$y = -3/4x^2 - 12x - 43$$

$$9) f(x) = x - 3$$

$$g(x) = 4x + 1$$

$$a) (f+g)(x) = f(x) + g(x)$$

$$\begin{aligned} & \cancel{(x-3)} + x - 3 + 4x + 1 \\ & = \underline{\underline{5x + 2}} \end{aligned}$$

$$\begin{aligned} (b) \quad (g-f)(x) & \quad (4x+1) - (x-3) \\ & = g(x) - f(x) \quad 4x+1-x+3 \end{aligned}$$

$$\begin{aligned} & 4x - x - 1 + 3 \\ & = \underline{\underline{3x + 2}} \end{aligned}$$

$$\begin{aligned} (c) \quad (fg)(x) & \quad (x-3) \cdot (4x+1) \\ f(x) \cdot g(x) & \quad x(4x+1) - 3(4x+1) \end{aligned}$$

$$\begin{aligned} & 4x^2 + x - 12x - 3 \\ & = \underline{\underline{4x^2 - 11x - 3}} \end{aligned}$$

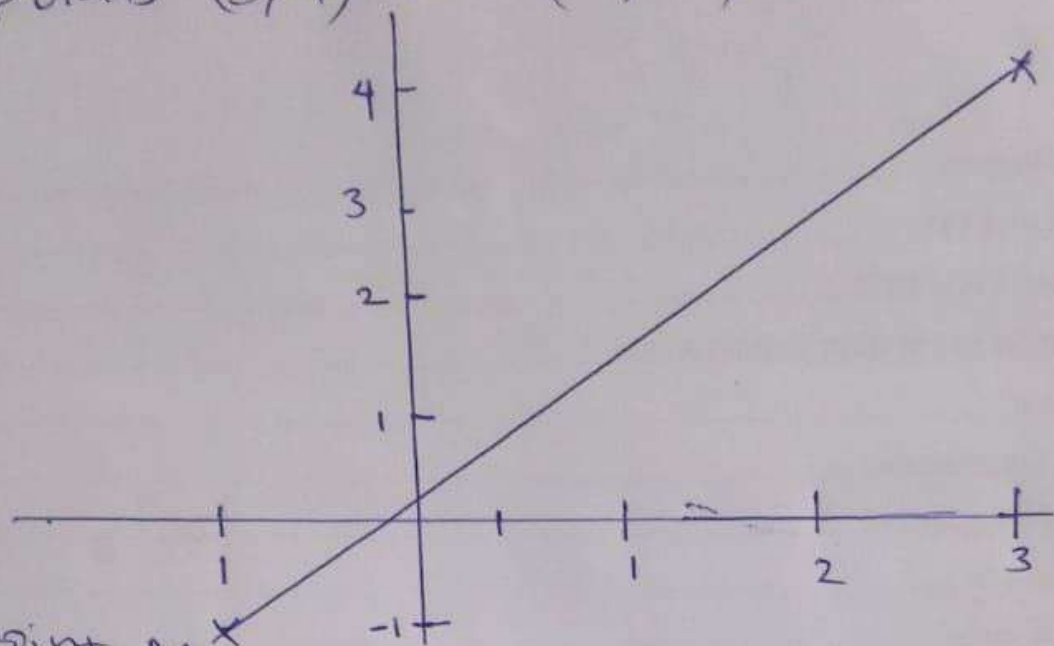
$$(d) \quad (f/g)(x)$$

$$\frac{f(x)}{g(x)} = \frac{x-3}{4x+1}$$

$$x = \frac{y-3}{4y+1}$$

① Domain is All real numbers
except $x = -\frac{1}{4}$

1. Points $(3, 4)$ and $(-1, -1)$



Midpoint M

$$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right) = \left(\frac{3 + (-1)}{2}, \frac{4 + (-1)}{2} \right)$$

$$\text{Midpoint} = (1, 1.5)$$

① Distance between the two points

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$= \sqrt{(-1 - 3)^2 + (-1 - 4)^2} = \sqrt{16 + 25}$$

$$= \sqrt{41}$$

$$\approx 6.4031$$

2.

$$x - 3y + 12 = 0$$

$$\frac{-3y}{-1} = \frac{-x}{-1} + \frac{-12}{-1}$$

$$\frac{3y}{3} = \frac{x}{3} + \frac{12}{3} \cdot 4$$

$$y = mx + c$$

$$y = x/3 + 4$$

x	0	3	6	9	12
y	4	5	6	7	8