1. It's not a function since we have 2 inputs each having 2 outputs.

2. $y = \cancel{y}\, x^2 + 1$ and $y^2 = x + 1$

$y = x^2 + 1 \quad x = 4$	$y^2 = x + 1 \quad x = 4$
$y = 4^2 + 1$	$y^2 = 4 + 1$
$y = 17$	$y^2 = 5$
✓ a function	$y^2 = \sqrt{5}$
	$y \approx 2.24$ or $y \approx -2.24$
	✗ not a function

3. Didn't fully understand. Need explenation.

4.

1) $f: \mathbb{Z} \to \mathbb{Z}$ defined by $f(n) = 3n$
yes, but didn't fully understand

2) $g = \begin{pmatrix} 1 & 2 & 3 \\ c & a & a \end{pmatrix}$, no since output "a" has two inputs.

3)
$$\begin{tikzcd} 1 \arrow[dr] & 2 \arrow[dl] & 3 \arrow[d] \\ 1 & 2 & 3 \end{tikzcd}$$
, yes since each has one output and one input.

5. Did not understand the solution.

6. Did not understand the solution.

7. $g(x) = 2\sqrt{x-4}$

$x - 4 \geq 0$

$x \geq 4$

$D: [4; +\infty)$

$g(4) = 2\sqrt{4-4}$

$g(4) = 2 \cdot 0 = 0 \rightarrow$

$g(5) = 2\sqrt{5-4}$

$g(5) = 2 \cdot 1 = 1$

$g(8) = 2\sqrt{8-4}$

$g(8) = 2 \cdot 2 = 4$

$R: [0; +\infty)$

8. $h(x) = \cancel{g}-2x^2 - 4x - 9 \rightarrow$ (might be mistype)

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

$y = -2 \cdot (-1)^2 - 4 \cdot (-1) - 9$

$y = -2 + 4 - 9 \rightarrow$

$y = -11$

$D: (-\infty; +\infty)$

$R: [-11; +\infty)$

9 Did not fully understand

$f(x) = \frac{x-4}{x^2-2x-15}$

$x^2 - 2x - 15 = 0$

$(x+3)(x-5) = 0$

$x+3=0 \qquad x-5=0$

$x=-3 \qquad x=5$

$D: (-\infty;3) \cup (-3;-5) \cup (-5;\infty).$

10

$$f(x) = \begin{cases} -2x+1 & -1 \le x < 0 \\ x^2+2 & 0 \le x \le 2 \end{cases}$$

$y = -2\cdot(-1)+1 \rightarrow 3$

$y = -2\cdot 0 + 1 \rightarrow 1$

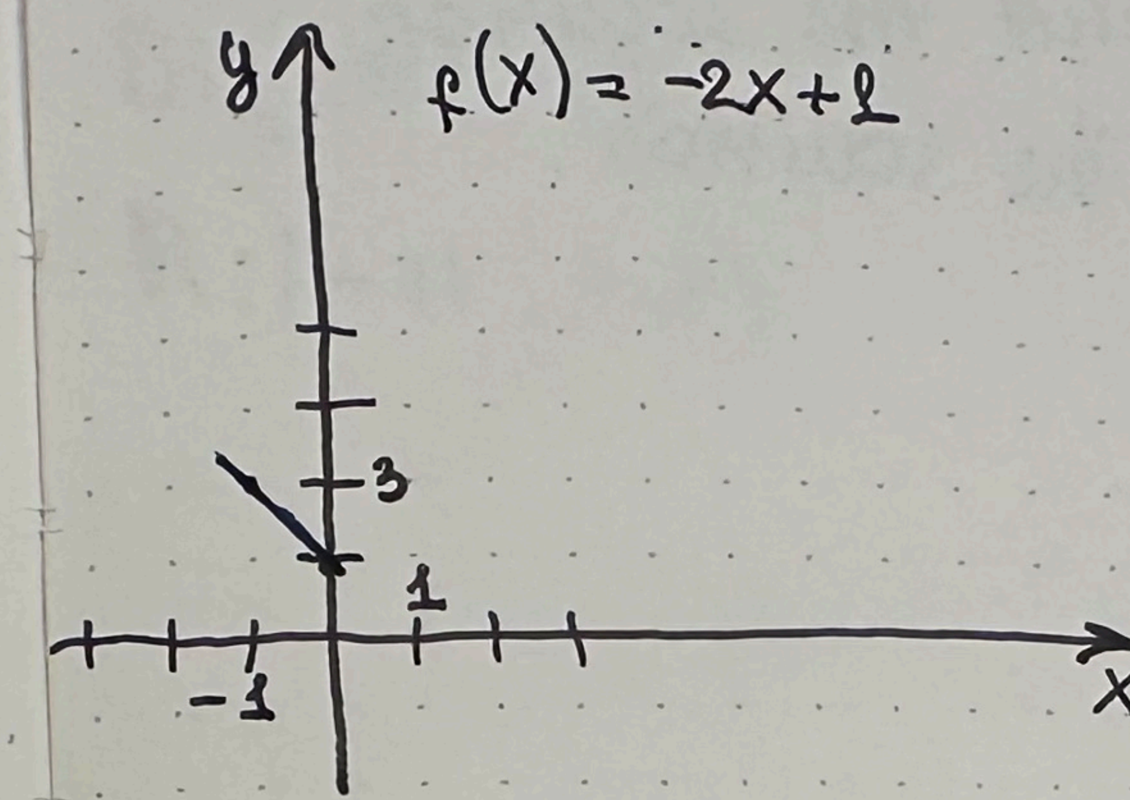
x	y
-1	3
0	1

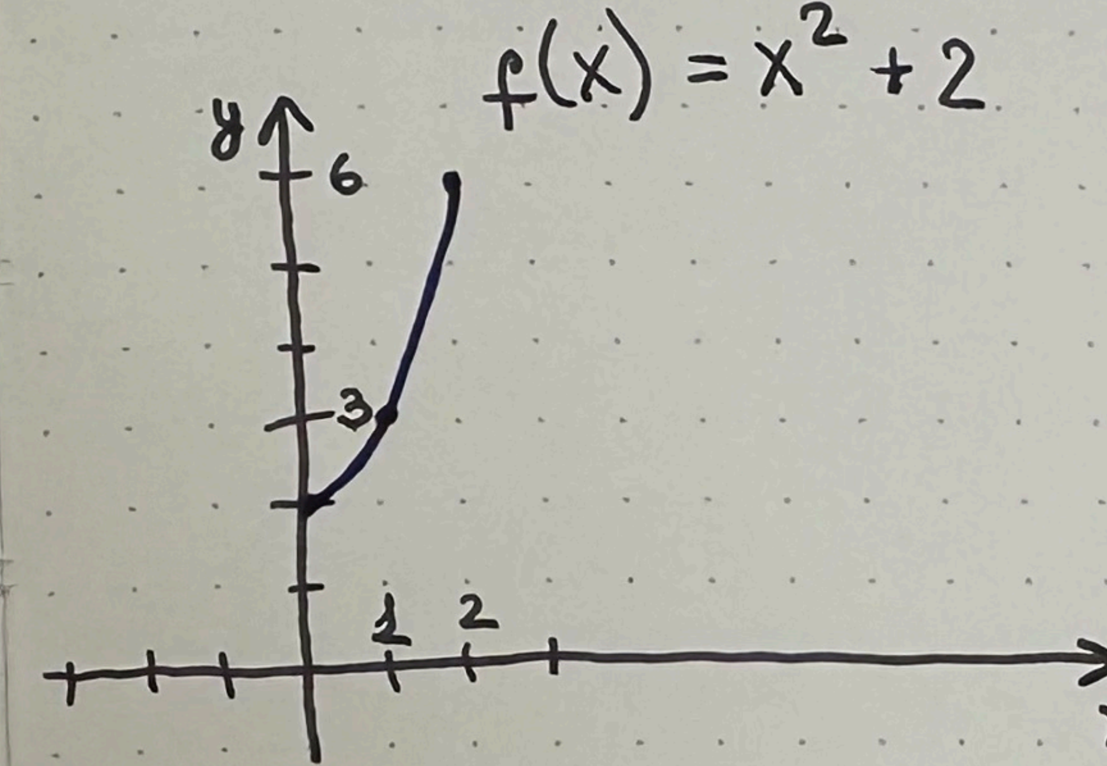
$y = 0^2 + 2 \rightarrow 2$

$y = 1^2 + 2 \rightarrow 3$

$y = 2^2 + 2 \rightarrow 6$

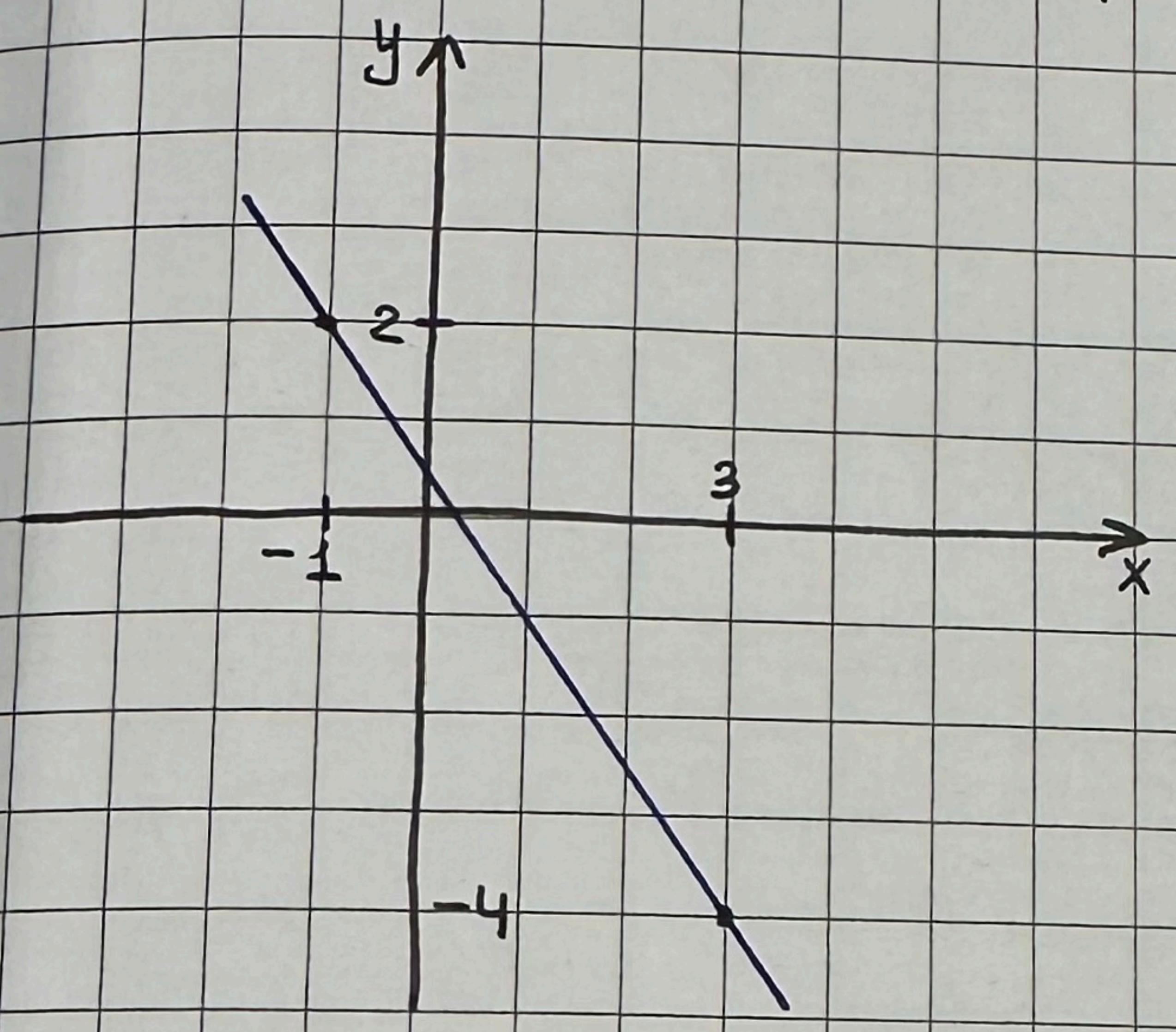
x	y
0	2
1	3
2	6





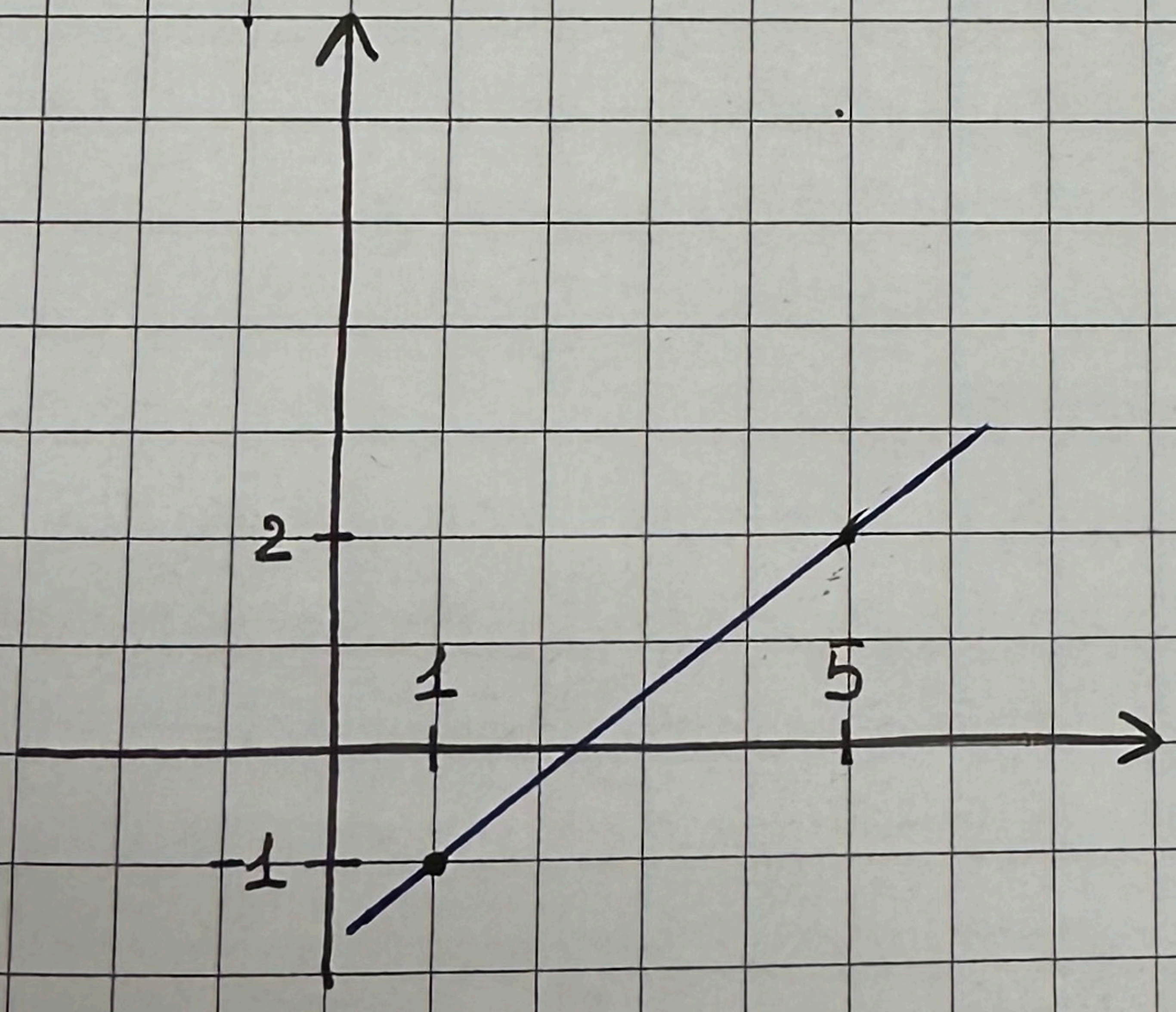
(11) Find slope $(-1;2)$ and $(3;-4)$

$$m = \frac{Rise}{Run} = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-4-2}{3-(-1)} = -\frac{6}{4} = -\frac{3}{2}$$



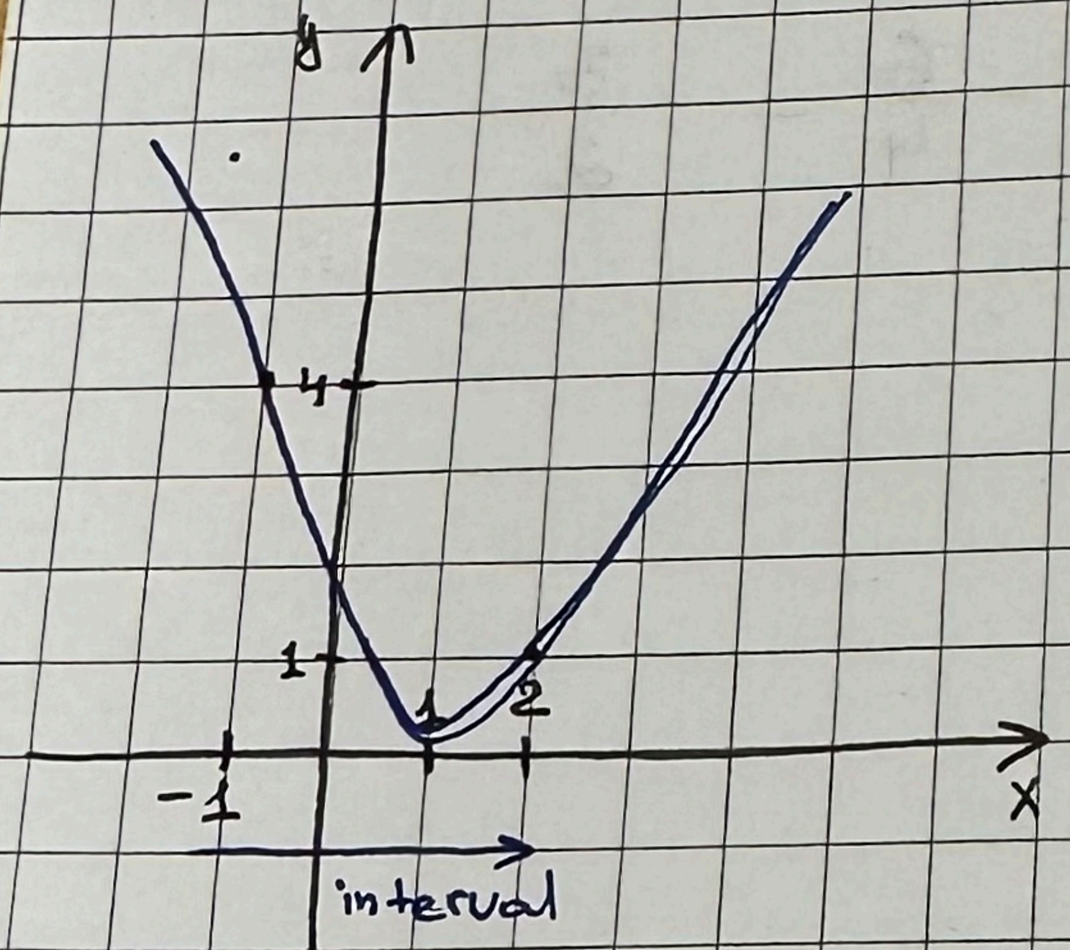
(12) Graph the line: $(1;-1)$ and $m = \frac{3}{4}$

$$m = \frac{Rise}{Run} = \frac{\Delta y}{\Delta x} = \frac{3}{4} \longrightarrow \quad y_2 = \underbrace{-1+3}_{2} \quad x_2 = \underbrace{1+4}_{5}$$



(13) Find m of the interval [-1; -2]

$$m = \frac{Rise}{Run} = \cancel{4-1}\ \frac{1-4}{2-(-1)} = -\frac{3}{3} = -1$$



(14) Compute m of $f(x) = x^2 - \frac{1}{x}$ on interval [2; 4]

$$f(x) = x^2 - \frac{1}{x}$$
$$f(2) = 2^2 - \frac{1}{2}$$
$$f(2) = 4 - \frac{1}{2}$$
$$f(2) = \frac{8-1}{2} = \frac{7}{2}$$

$$f(x) = x^2 - \frac{1}{x}$$
$$f(4) = 4^2 - \frac{1}{4}$$
$$f(4) = 16 - \frac{1}{4}$$
$$f(4) = \frac{64-1}{4} = \frac{63}{4}$$

$$m = \frac{Rise}{Run} = \frac{\Delta y}{\Delta x} = \frac{f(4) - f(2)}{4-2} = \frac{\frac{63}{4} - \frac{7}{2}}{2} = \frac{\frac{63-14}{4}}{2} =$$

$$= \frac{49}{2 \cdot 4} = \frac{49}{8}$$

(15) Given $f(t) = t^2 - t$ and $h(x) = 3x + 2$, evaluate $f(h(1))$

$f(t) = t^2 - t$ $\qquad$ $h(x) = 3x + 2$

$f(h(1)) = 5^2 - 5$ $\qquad$ $h(1) = 3 \cdot 1 + 2$

$f(h(1)) = 25 - 5$ $\qquad$ $h(1) = 5$

$f(h(1)) = 20$

(16) Find Domain of $(f \cdot g)(x)$

$f(x) = \frac{5}{x-1}$ $\qquad$ $g(x) = \frac{4}{3x-2}$

$\frac{4}{3x-2} = 1$

$4 = 1 \cdot 3x - 2$

$4 = 3x - 2$

$4 + 2 = 3x$

$6 = 3x \quad /:3$

$2 = x$

$x \neq \frac{2}{3}$ $\quad$ $x \neq 2$ $\qquad$ $D: \left(-\infty, \frac{2}{3}\right) \cup \left(\frac{2}{3}, 2\right) \cup (2; +\infty)$

⑰ Are they same functions?

$(g-f)(x)$ and $\left(\frac{g}{f}\right)(x)$

$f(x) = x-1$ $\quad$ $g(x) = x^2-1$

$$(g-f)(x) = (x^2-1)-(x-1) = x^2\cancel{-1}-x\cancel{+1} = x^2-x = x(x-1)$$

$$\left(\frac{g}{f}\right)(x) = \frac{x^2-1}{x-1} = \frac{(x+1)\cancel{(x-1)}}{\cancel{x-1}} = x+1$$

~~x(x)~~ $x(x-1) \neq x+1$

⑲ Write formula that shifts $f(x) = \frac{1}{x}$

$f(x) = \frac{1}{x}$ $\quad$ $\xrightarrow{+1} x$ $\quad$ $y \uparrow +1$

$f(x) \quad \frac{1}{x-1} + 1$

⑳ $f(x) = x^3+2x \rightarrow$ even, odd, or neither?

1) $f(x) = f(-x) \rightarrow$ even

2) $f(x) = -f(x) \rightarrow$ odd

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

2) $-f(-x) = -(-x^3+2(-x)) = x^3+2x$ $\quad$ odd function

(21) $f(s) = s^4 + 3s^2 + 7$, even, ~~odd~~ or neither?

$f(s) = f(-s)$

$-f(-s) = \cancel{f(-s)}\ -f(s)$

$f(-s) = (-s)^4 + 3 \cdot (-s)^2 + 7$ $\qquad$ $-f(-s) = -((-s)^4 + 3 \cdot (-s)^2 + 7)$

$f(-s) = s^4 + 3s^2 + 7$ $\qquad$ $-f(-s) = -(s^4 + 3s^2 + 7)$

This is even function.

(22) Write the point-slope of equation of the line $(5,1)$ and $(8,7)$

point-slope form $\longrightarrow$ $y - y_1 = m(x - x_1)$

$$m = \frac{\text{Rise}}{\text{Run}} = \frac{\Delta y}{\Delta x} = \frac{7-1}{8-5} = \frac{6}{3} = 2$$

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

$y - 1 = 2x + 10$

$y = 2x + 10 + 1$

$y = 2x + 9$

(23) Is function decreasing or increasing? $(3;-2)$ and $(8;1)$

$$m = \frac{\text{Rise}}{\text{Run}} = \frac{\Delta y}{\Delta x} = \frac{1-(-2)}{8-3} = \frac{3}{5} = 0{,}6$$

Since $m > 0$, this function is increasing.

N29 HW1

1) Identify A, B, C

2) Find h, the x-cor. of the vertex, $h = -\frac{b}{2a}$

3) Find k, the y-cor of the vertex, $K = f(h) = f\left(-\frac{b}{2a}\right)$

4) Rewrite in standard form

General form → $f(x) = ax^2 + bx + c$ } $b, c = \mathbb{R}; A \neq 0$

Standart form → $f(x) = a(x-h^2)+k$

$f(x) = 2x^2 - 6x + 7$

2) $h = \frac{6}{2a} = \frac{6}{2 \cdot 2} = \frac{6}{4} = \frac{3}{2}$

3) $K = f(h) = f\left(\frac{3}{2}\right) = 2\left(\frac{3}{2}\right)^2 - 6\left(\frac{3}{2}\right) + 7 = 2 \cdot \frac{9}{4} - 9 + 7 = \frac{9}{2} - 9 + 7 = -\frac{9}{2} + 7 = -\frac{9}{2} + \frac{7}{1} = \frac{-9+14}{2} = \frac{5}{2}$

4) $f(x) = 2\left(x - \frac{3}{2}\right)^2 + \frac{5}{2}$

FIRE

N30 HW1

1) Identify domain

2) Determine a is pos. or neg. If a is pos. → parabola has min. If a is neagaive → parabaola has max.

3) Determine the max and min val of paraboala, K.

4) Paraboala has min → $f(x) \geq K$, or $[K, \infty)$

Parabaala has max → $f(x) \leq K$, or $(-\infty; K]$.

$f(x) = -5x^2 + 9x - 1$ 1) Domain: $R\ (-\infty, \infty)$

2)

$$h = -\frac{b}{2a} = -\frac{9}{2\cdot(-5)} = \frac{9}{10}$$

$$3)\ K = f(h) = f\left(-\frac{b}{2a}\right) = -5\left(\frac{9}{10}\right)^2 + 9\left(\frac{9}{10}\right) - 1 = -\frac{\cancel{5}}{1}\cdot\frac{81}{\cancel{100}_{20}} + \frac{81}{10} - 1 = -\frac{^{1)}81}{20} + \frac{^{2)}81}{10} - 1 = \frac{-81+162}{20} - 1 = \frac{^{1)}81}{20} - \frac{^{20)}1}{1} = \frac{81-20}{20} = \frac{61}{20}$$

$$4)\ f(x) \leq \frac{61}{20}, \text{ or } \left(-\infty; \frac{61}{20}\right]$$

N31 HW1

1) Evaluate $f(0)$ to find the y - Intersept

2) Solve the quadric equation $f(x)=0$ to find x - intersept.

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

$f(0) = y = 3\cdot(0)^2 + 5\cdot 0 - 2 = -2$

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

$f(x) = 0 \longrightarrow 3x^2 + 5x - 2 = 0$

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

$3x - 1 = 0$

$3x = 1$

$x = \frac{1}{3}$

$x + 2 = 0$

$x = -2$

2) $x = \left(\frac{1}{3}; 0\right) \cup (-2; 0)$

N32 HW1

Solve inequalities

a. $-1 \le 2x - 5 < 7$

b. $x^2 + 7x + 10 < 0$

c. $-6 < x - 2 < 4$

$x = >; <$ ⟶ open circle

$x = \ge; \le$ ⟶ closed circle

a. $-1 \le 2x - 5 < 7$

$-1 + 5 \le 2x \cancel{-5+5} < 7 + 5$

$4 \le 2x < 7 + 5$

$4 \le 2x < 12 \;|:2$

$2 \le x < 6$

$[2;6)$

b $x^2 + 7x + 10 < 0$

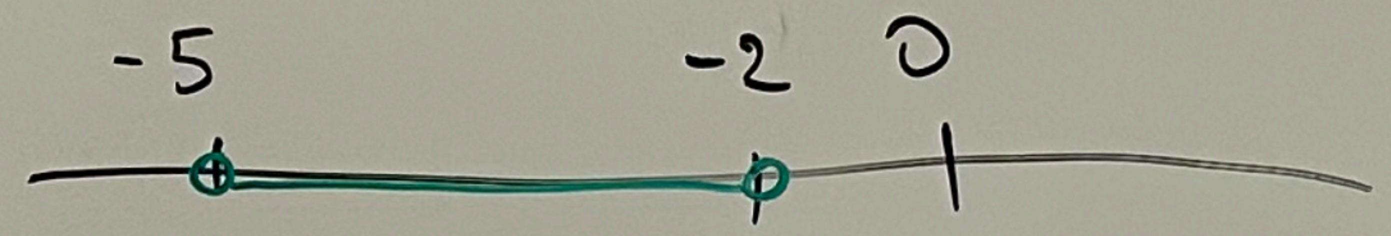
$(x+5)(x+2) < 0$

$x + 5 = 0 \qquad x + 2 = 0$

$x = -5 \qquad x = -2$

$x > -5 \cup x < -2$

$(-5;-2)$

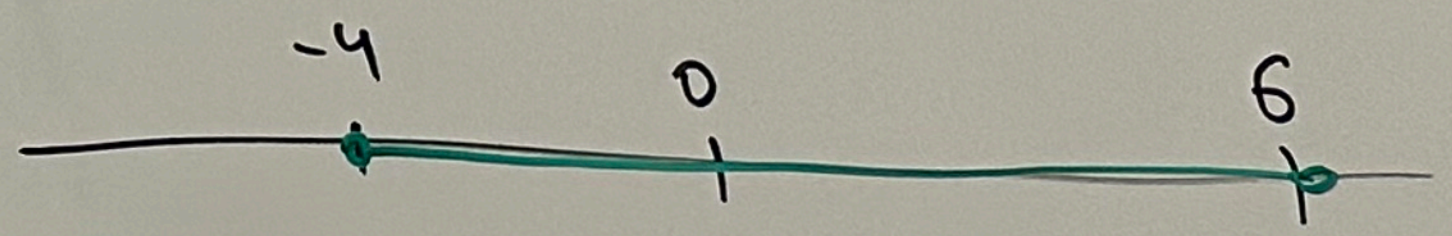


c. $-6 < x - 2 < 4 \quad +2$

$-6 + 2 < x \cancel{-2+2} < 4 + 2$

$-4 < x < 6$

$(-4;6)$



(33) $10-(2y+1) \le -4(3y+2)-3$

$-2y+9 \le -12y-11$

$-2y+12y+9 \le \cancel{-12y+12y}+(-11)$

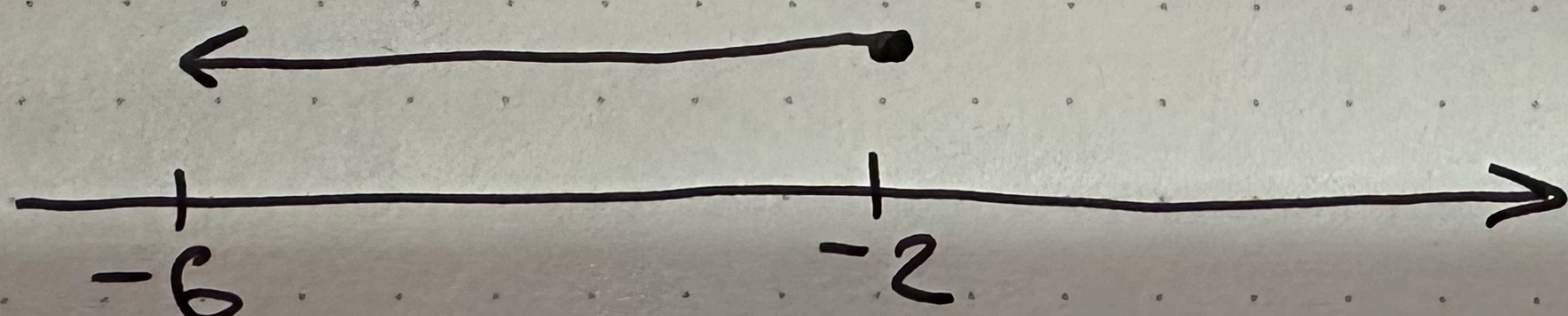
$10y+9 \le -11$

$10y \cancel{+9-9} \le -11-9$

$10y \le -20 \quad | :10$

$y \le -2$

$\{y \mid y \le -2\}$; $(-\infty; -2]$



36 $f(x) = -\frac{1}{2}|4x-5|+3 \qquad f(x)<0$

$-\frac{1}{2}|4x-5|+3<0$

$-\frac{1}{2}|4x-5|<-3 \quad |\cdot(-2)$

$|4x-5|<6$

$|4x-5|\geq 6$

$4x-5=6 \qquad 4x=1 \qquad x=\cancel{-\frac{1}{4}}\ \frac{1}{4}$

$4x-6=6 \qquad 4x=12 \quad |:4 \qquad x=3$

$4x-5=-6 \qquad 4x=-11 \qquad x=\cancel{\frac{11}{4}}\ \frac{11}{4}$

$x<-\frac{1}{4}$ or $x>\frac{11}{4}$

$(-\infty; 0.25) \cup (2.75; \infty+)$

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$$13 - 2|4x-7| \leq 3$$

$$-2|4x-7| \leq 3-13$$

$$-2|4x-7| \leq -10 \quad /:-2$$

$$|4x-7| \geq 5$$

$4x-7 \geq 5$ $\qquad$ $4x-7 \leq -5$

$4x \geq 5+7$ $\qquad$ $4x \leq -5+7$

$4x \geq 12 \quad /:4$ $\qquad$ $4x \leq 2$

$x \geq 3$ $\qquad$ $x \leq \frac{2}{4} = \frac{1}{2}$

$$\left(-\infty; \frac{1}{2}\right] \cup [3; +\infty)$$

(24) Show absolute max and min

max = (-2; 16) and (2; 16)

min = (3; -10)

(25) Find local maxima and minima

max = (1; 2)

min = (-1; -2)

(26)

1) $f(x) = 2x + 3$ $\quad x = 1; x = -1$

$y = 2 \cdot 1 + 3 = 5$

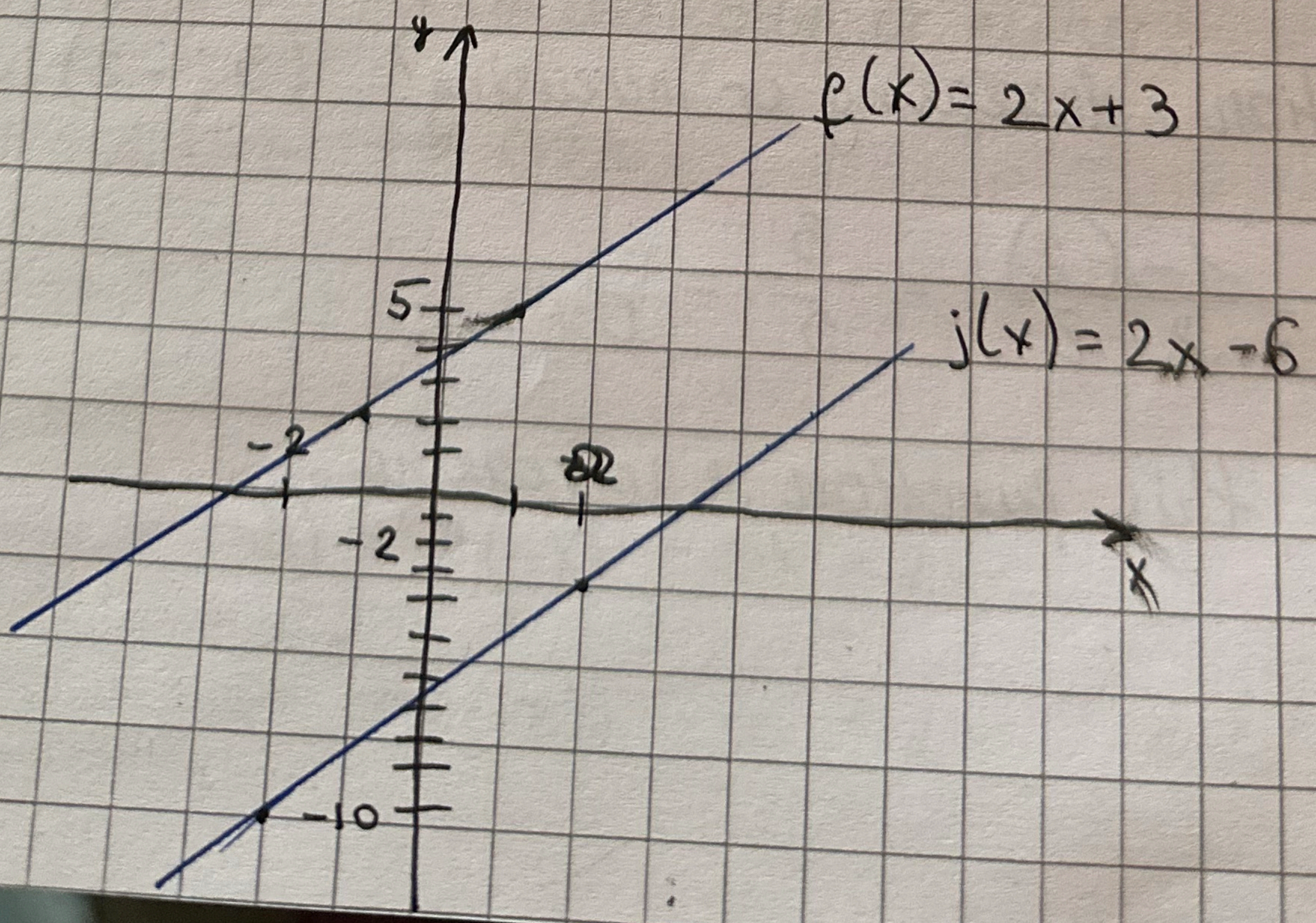
$y = 2 \cdot (-1) + 3 = 1$

2) $j(x) = 2x - 6$ $\quad x = 2; x = -2$

$y = 2 \cdot 2 - 6 = -2$

$y = 2 \cdot (-2) - 6 = -10$

3) $g(x) = \frac{1}{2}x - 4$ $\quad$ 4) $h(x) = -2x + 2$



27

$$\begin{cases} 2x+y=7 \\ x-2y=6 \end{cases}$$

$\cancel{x-2y=6}$

$\cancel{x=6+2y}$

$y=7-2x$

$x-2y=6$

$x-\cancel{6}2(7-2x)=6$

$x-14+4x=6$

$x+4x=6+14$

$5x=20 \; /:5$

$x=\cancel{5}4$

$(4;-1)$

$2x+y=7$

$2\cdot 4+y=7$

$8+y=7$

$y=7-8$

$y=-1$

28

$$\begin{cases} 4x+2y=4 \\ 6x-y=8 \end{cases}$$

$4x+2y=4 \; /\cancel{:2}$

$2y=4-4x \; /:2$

$y=2-2x$

$6x-y=8$

$6\cancel{x}(2-2x)-y=8$

$\cancel{12}\; 6x+2x-2=8$

$8x=8+2$

$8x=10 \; /:2$