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

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

$y = x^2 + 1 \quad x = 4$

$y = 4^2 + 1$

$y = 17$

✓ a function

$y^2 = x + 1 \quad x = 4$

$y^2 = 4 + 1$

$y^2 = 5$

$y^2 = \sqrt{5}$

$y \approx 2.24$ or $y \approx -2.24$

X not a function

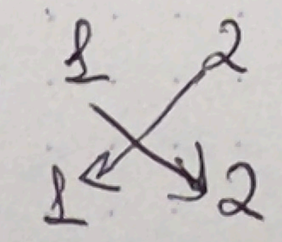
3. Didn't fully understand. Need explanation.

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) 

, 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. $h(x) = -2x^2 - 4x - 9 \rightarrow$ (might be mistype)

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

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

$y = -2 + 4 - 9$

$y = -11$

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

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

(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)

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

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

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

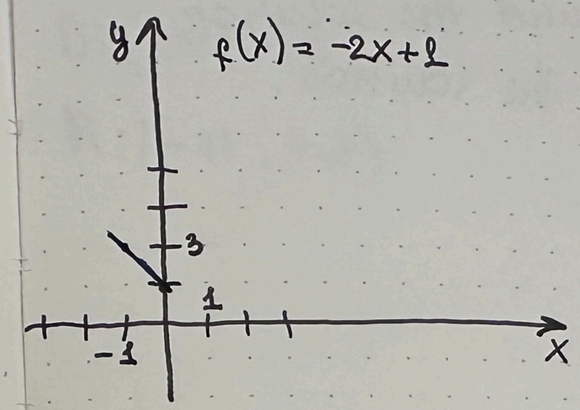
x	y
-1	3
0	1

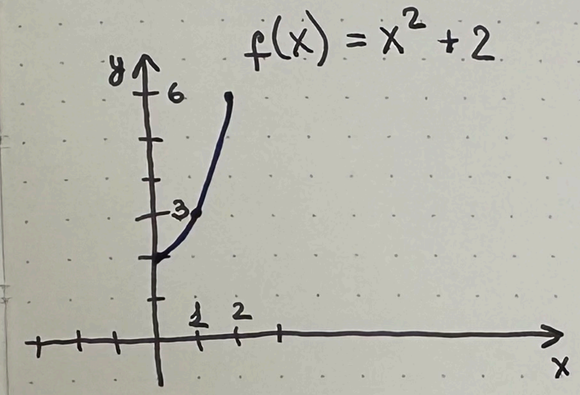
$y = 0^2+2 \rightarrow 2$

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

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

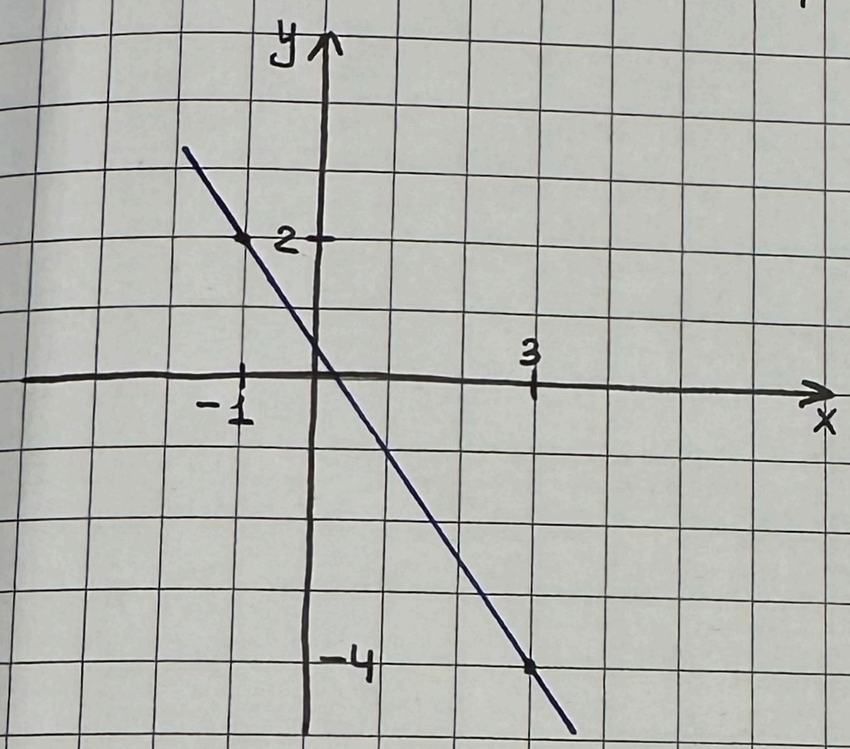
x	y
0	2
1	3
2	6





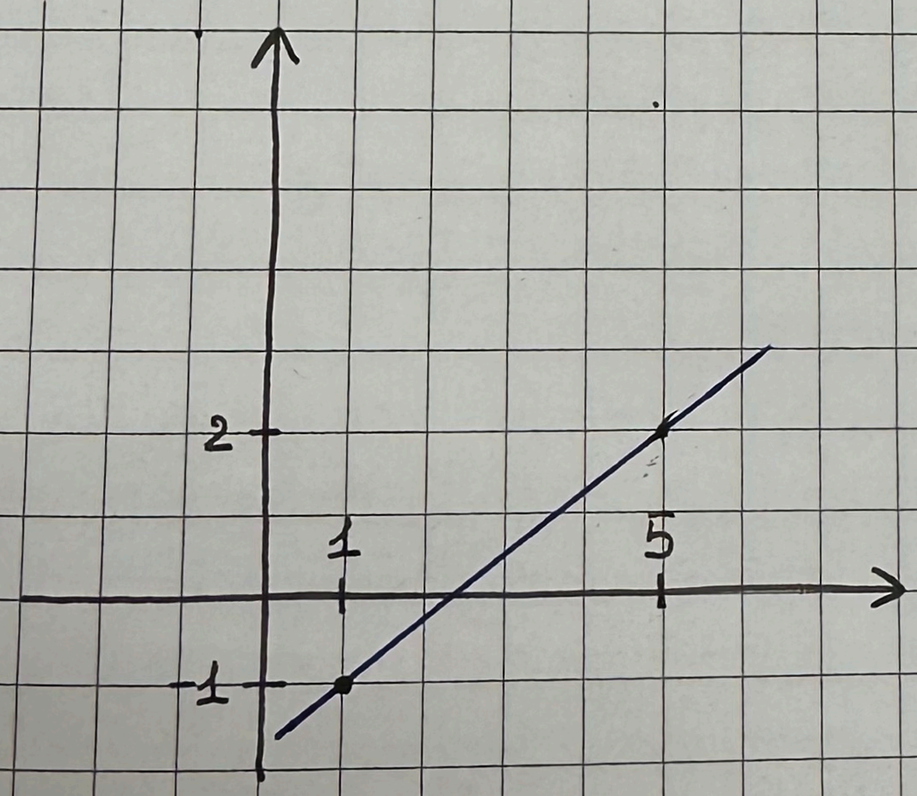
(11) Find slope $(-1;2)$ and $(3;-4)$

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

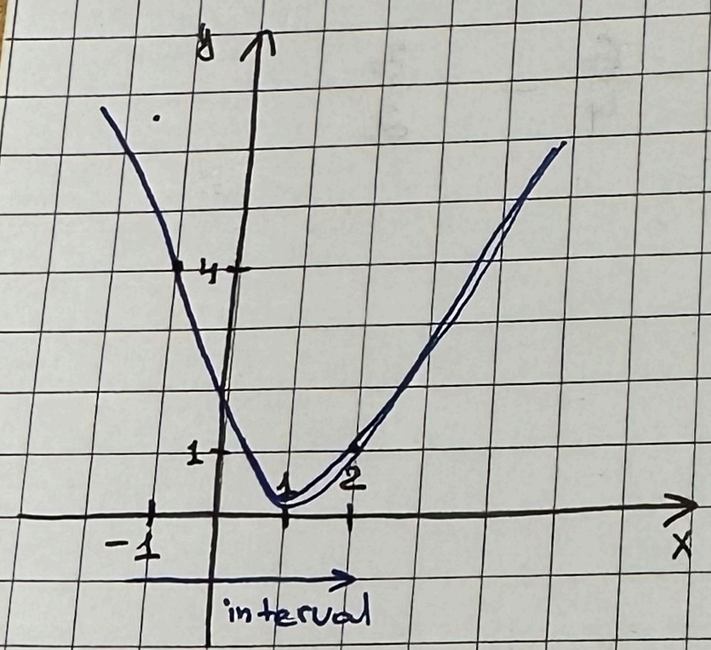


(12) Graph the line: $(1;-1)$ and $m = \frac{3}{4}$

$$m = \frac{\text{Rise}}{\text{Run}} = \frac{\Delta y}{\Delta x} = \frac{3}{4} \longrightarrow y_2 = \overset{2}{-1+3} \qquad x_2 = \overset{5}{1+4}$$



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



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

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

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

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

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

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

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

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

$$f(4) = 16 - \frac{1}{4}$$

$$f(4) = \frac{64-1}{4} = \frac{63}{4}$$

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

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

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

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

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

$4 = 1 \cdot 3x - 2$

$4 = 3x - 2$

$4 + 2 = 3x$

$6 = 3x \quad | :3$

$2 = x$

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

(17) Are they same functions?

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

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

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

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

$\cancel{x(-x)}$ $x(x-1) \neq x+1$

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

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

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

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

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

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

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

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

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

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

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

This is even function.

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

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

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

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

$y - 1 = 2x + 10$

$y = 2x + 10 + 1$

$y = 2x + 9$

(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.