stretch

HomeWork week 1

① Name → Ph.

Lydia → 1 h
Eugene → 2 c
Jared → 3 c
Rick → 4 h
Morty → 5 c
6 c

is it function?

one input has several outputs → not a function

② 1) $y = x^2 + 1$

for any x, there's a y.

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

$y = (2)^2 + 1 = 5$. then It's A function.

2) $y^2 = x + 1$

$y^2 = 1 + 1$

$y^2 = 2$

$y = \pm 2$ → two outputs for 1 input
not a function

③ onto - each output has at least 1 input.

1) $f: \mathbb{Z} \to \mathbb{Z}$ $f(n) = 3n$ ~~[illegible]~~ ^ could be $\frac{1}{3}$ not 2 → so not onto

2) $g: \{1,2,3\} \to \{a,b,c\} \to g = \begin{pmatrix} 1 & 2 & 3 \\ c & a & a \end{pmatrix}$
b is not in matrix, not onto

3) $h: \{1,2,3\} \to \{1,2,3\} \Rightarrow$ onto

④ one-to-one - each output has at most 1 input

1) $f: \mathbb{Z} \to \mathbb{Z} \cdot f(n) = 3n \Rightarrow$ one-to-one

2) $g: \{1,2,3\} \to \{a,b,c\}$ $g = \begin{pmatrix} 1 & 2 & 3 \\ c & a & a \end{pmatrix}$

Both 2, 3 → has a as input
- not one-to-one

3) $h: \{1,2,3\} \to \{1,2,3\} \Rightarrow$ one-to-one

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

$g = f^{-1}$ - ?

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

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

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

$x(y+2) = 1$

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

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

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

6) 1) $f(x) = 2 + \sqrt{x-4}$

$y = 2 + \sqrt{x-4}$

$x = 2 + \sqrt{y-4}$

$\left(\sqrt{y-4}\right)^2 = (x-2)^2$

~~$y-4 = \pm (x-2)^2$~~

~~$y_1 = (x-2)^2 + 4$~~ ~~$y_2 = -(x-2)^2 + 4$~~

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

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

$f^{-1}(x) = (x-2)^2 + 4 \quad D \; x \in [2, \infty)$

~~7)~~ $\frac{9}{5} \cdot C = \frac{5}{9}(F-32) \cdot \frac{9}{5}$

$\frac{9}{5}C = F - 32$

$F = \frac{9}{5}C + 32$

$C = g(F) = \frac{5}{9}(F-32)$

$F = g^{-1}(C) = \frac{9}{5}C + 32$

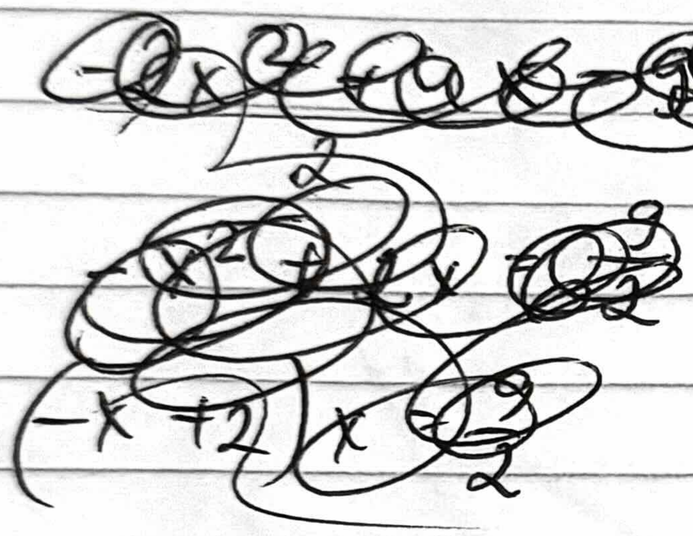
f) $g(x) = 2\sqrt{x-4}$

$D \Rightarrow x \in [4, \infty)$

$R \Rightarrow \mathbb{R} \setminus (-\infty, 4)$ $\quad [0, \infty)$

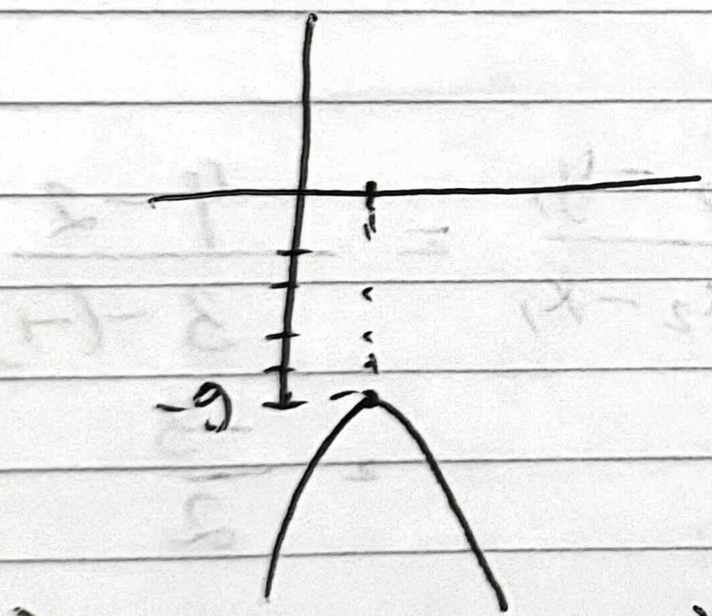
g) $h(x) = -2x^2 + 4x - 9$ $\quad D: (-\infty, \infty)$

look down (-2) coeffic



vertex: $-\frac{b}{2a}$ $\quad a = -2$

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



$x = 1 \quad y = -9$

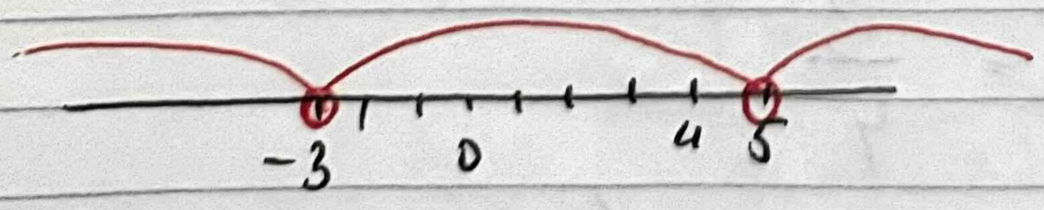
$R: (-\infty, -9]$

h) $f(x) = \frac{x-4}{x^2-2x-15}$ $\quad D: ?$

$\frac{x-4}{(x-5)(x+3)} \geq 0$

$x \neq 5$

$x \neq -3.$



$D = (-\infty, -3) \cup (-3; 5) \cup (5; \infty)$

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

$-2x+1 = y$

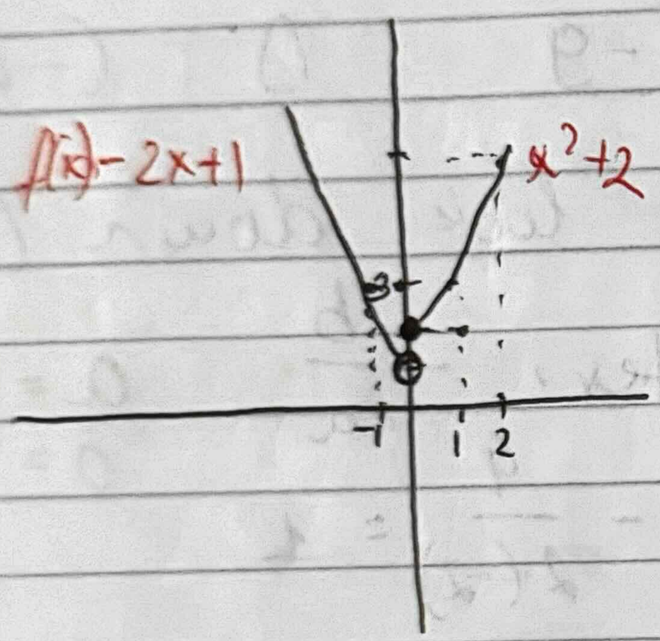
$-2(-1)+1 = 3 = y$

$x^2+2 = y$

$x=0 \quad y=2$

$x=1 \quad y=3$

$x=2 \quad y=6$

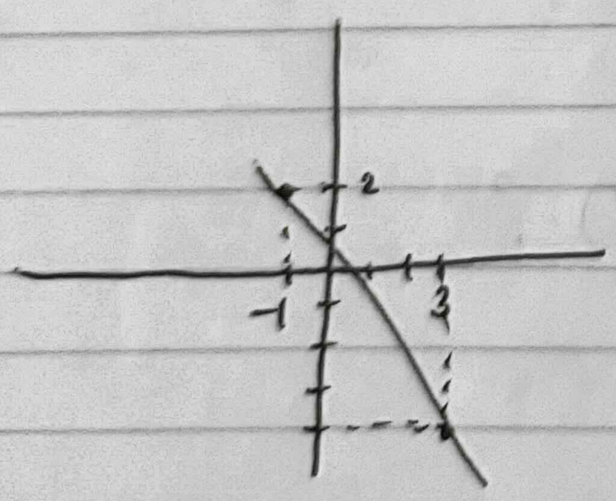


12) $(-1, 2)$ $(3, -4)$

$x_1 \; y_1 \quad x_2 \; y_2$

$\text{slope} = m = \frac{\text{rise}}{\text{run}} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-4-2}{3-(-1)} = \frac{-6}{4} =$

$= \frac{-3}{2}$



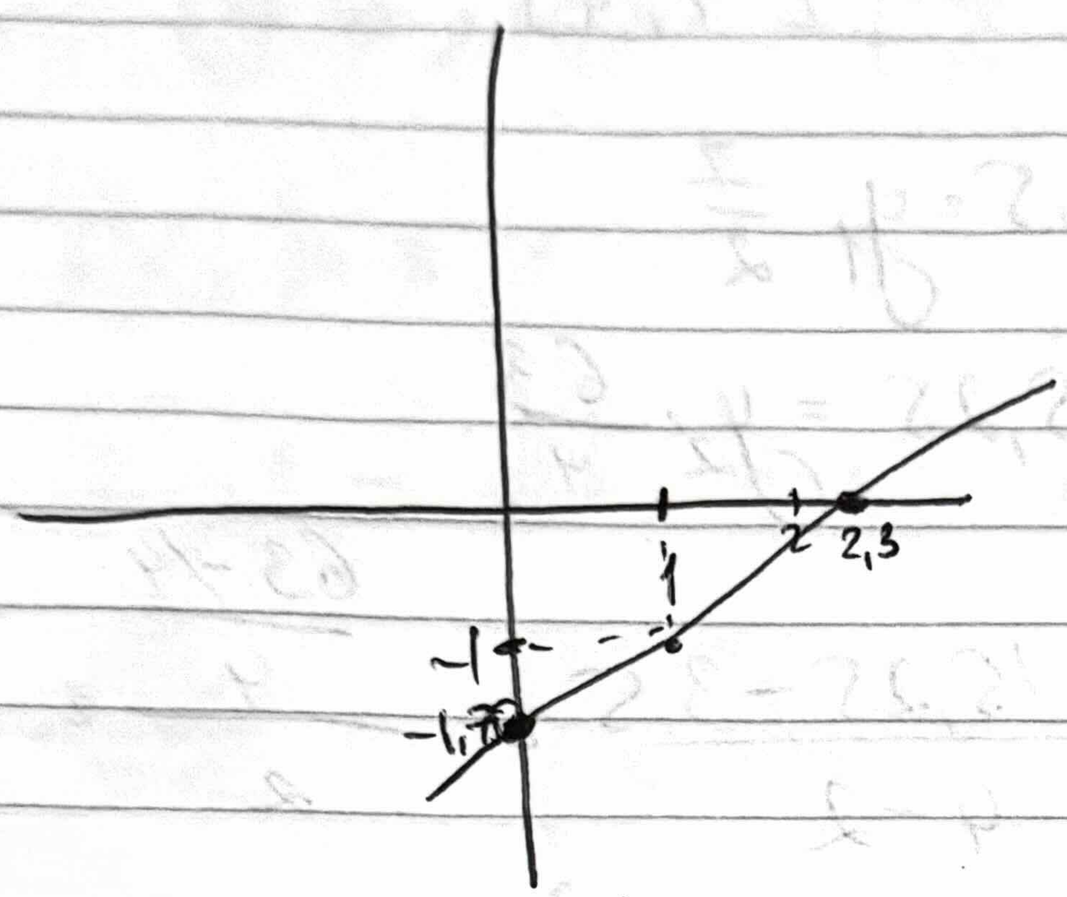
13) $(1, -1)$ $\quad m = \frac{3}{4}$

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

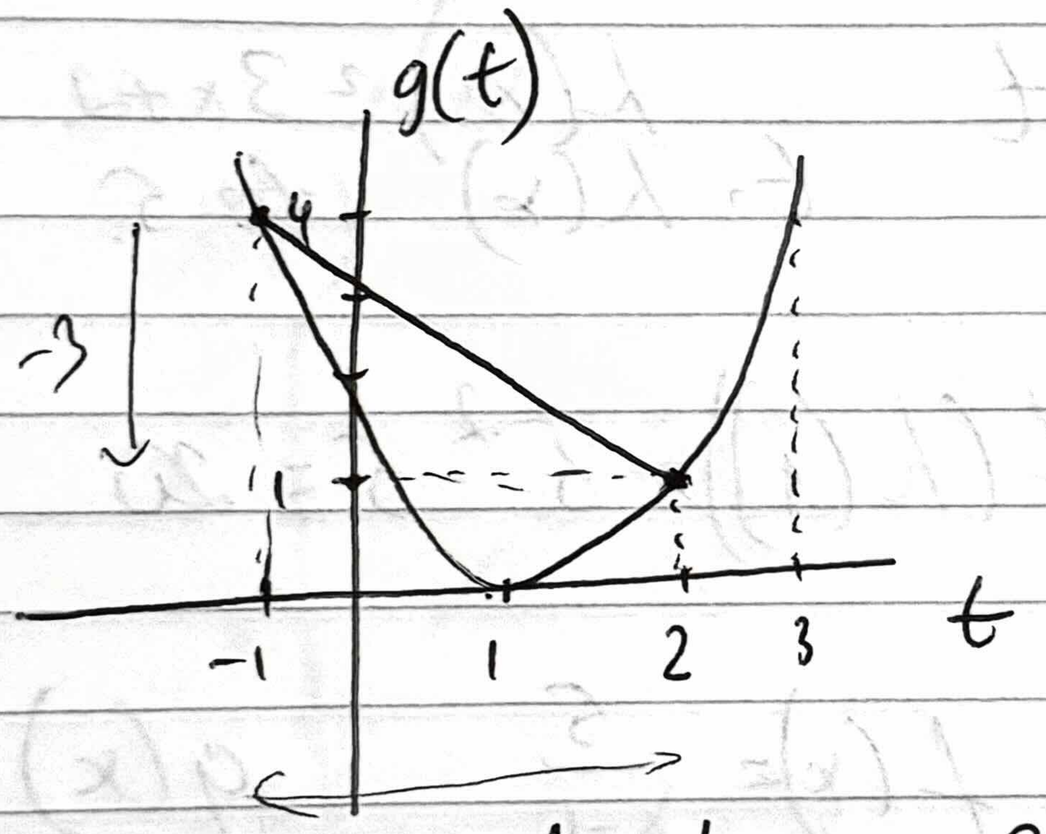
$\frac{3x-7}{4} = y$

$y=0 \quad x = \frac{7}{3} = 2.3$

$x=0 \quad y = \frac{-7}{4} = -1.75$



(4)



$t_1 = -1 \quad g(-1) = 4$

$t_2 = 2 \quad g(2) = 1$

$\Delta t = 3$

$\Delta g(t) = -3$

$$\frac{1-4}{2-(-1)} = \frac{-3}{3} = -1$$

15) $f(x) = x^2 - \frac{1}{x}$ $[2, 4]$

$f(x) = 2^2 - \frac{1}{2} = 3,5 = y_1 \frac{7}{2}$

$f(x) = 4^2 - \frac{1}{4} = 15,25 = y_2 \frac{63}{4}$

$16 - \frac{1}{4} = \frac{63}{4}$

$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{15,25 - 3,5}{4 - 2} = \frac{\frac{63-14}{4}}{2} = \frac{49}{8}$

6) $f(t) = t^2 - t$ $h(x) = 3x + 2 = h(1) = 5$

$f(h(1)) =$ $\quad$ t. $h(x) \neq 5$.

~~$f(h(1))$~~ $f(h(1)) = 5^2 - 5 = 20$

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

$x \neq \frac{2}{3}$

$\frac{5}{\left(\frac{4}{3x-2}\right) - 1} \Rightarrow$ $\frac{4 - 3x + 2}{3x - 2} \neq 0$

$\frac{6 - 3x}{3x - 2} \neq 0$ $\quad x \neq \frac{2}{3}$

~~$D_f \; x \in \mathbb{R} \setminus \{\frac{2}{3}\}$~~

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

$3x - 2 = 4$

$3x = 6$

$x = 2$ $\quad x \neq 2$

$x \in (-\infty, \frac{2}{3}) \cup (\frac{2}{3}, 2) \cup (2, \infty)$

18) $(g-f)(x) = ?$ $\left(\frac{g}{f}\right)x = ?$

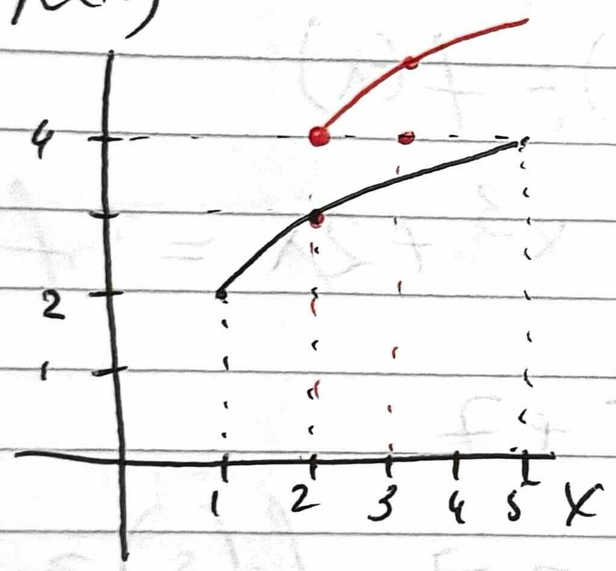
$f(x) = x-1$ $\quad g(x) = x^2-1$

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

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

not the same

19) $h(x)$



$y = a x^2 + bx + c$

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

$(1,2) \quad (2,3)$

$2 = a \cdot 1^2 + b \cdot 1 + c$

$3 = a \cdot 2^2 + b \cdot 2 + c$

$3a + b = 1$

$b = 1 - 3a = -2$

$1 = -\frac{1+3a}{2a}$

$2a = -1 + 3a$

$1 = a$

$y = x^2 - 2x$

$h(x) = +(x-1) + 2$

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

D: $x \in [1, \infty)$ R $[2, \infty)$