

5h)

$$y = 2 - |x|$$

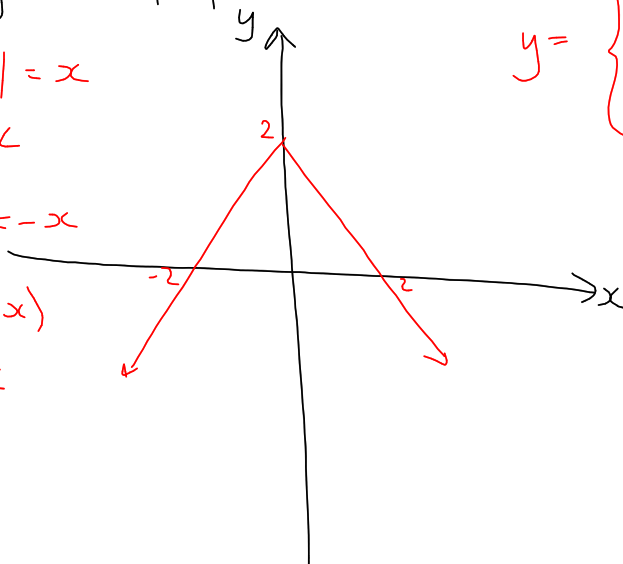
$$\underline{x \geq 0}, |x| = x$$

$$y = 2 - x$$

$$\underline{x < 0}, |x| = -x$$

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

$$y = 2 + x$$



$$y = \begin{cases} 2 - x & , x \geq 0 \\ 2 + x & , x < 0 \end{cases}$$

$$7b) \quad \underline{f(x) = |x| + x} \quad \text{even}$$

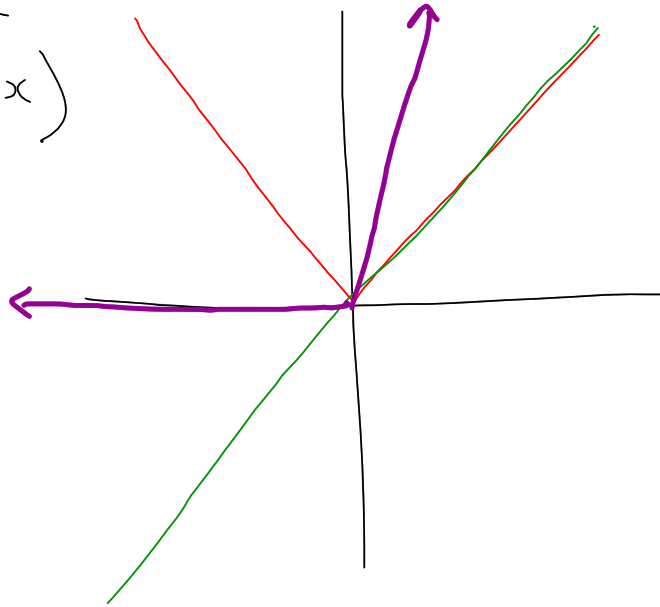
$$-f(x) = -(|x| + x) \quad \text{odd}$$

$$f(-x) = |-x| + (-x)$$

$$= |x| - x$$

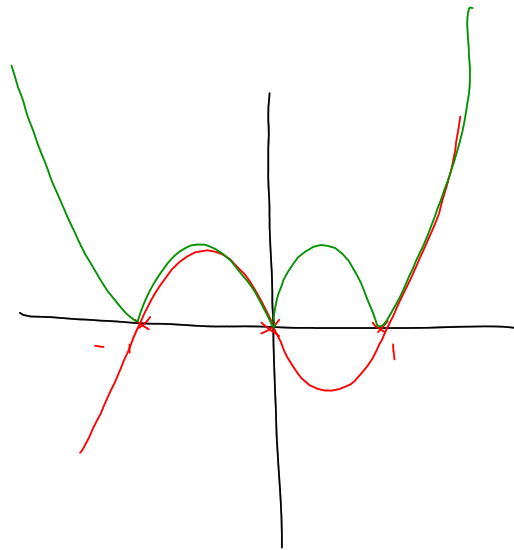
$$= -(-|x| + x)$$

\therefore neither



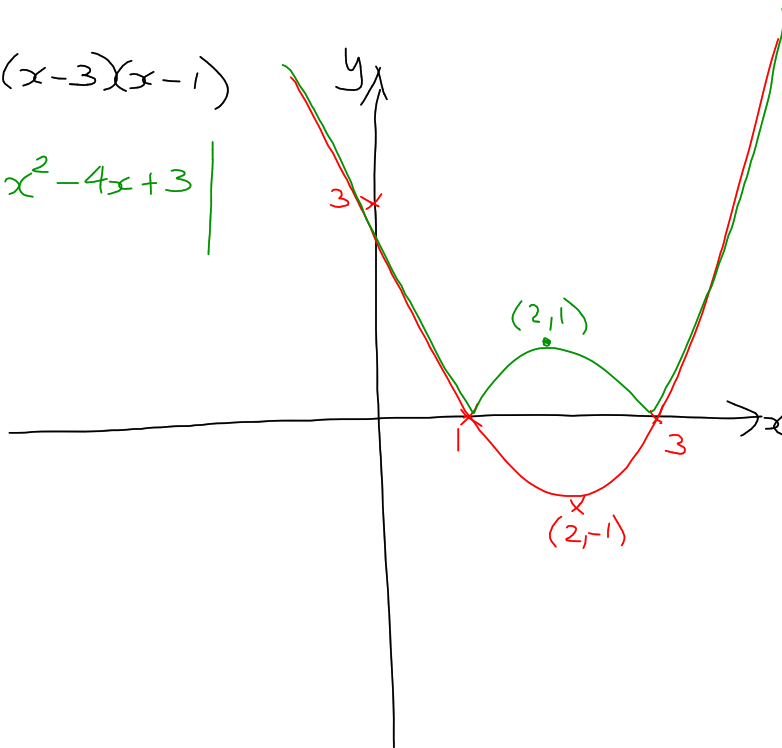
$$7d) f(x) = |x^3 - x|$$

$$\begin{aligned} f(-x) &= |(-x)^3 - (-x)| \\ &= |-x^3 + x| \\ &= |-1| |x^3 - x| \\ &= |x^3 - x| \\ &= f(x) \\ &\quad \underline{\text{even}} \end{aligned}$$



9 $y = (x-3)(x-1)$

$y = |x^2 - 4x + 3|$



$$14 \quad y = \frac{1}{|x-1|} = \begin{cases} \frac{1}{x-1} & , x > 1 \\ \frac{1}{1-x} & , x < 1 \end{cases}$$

$$|x-1| \neq 0$$

$$x \neq 1$$

domain all real x except $x \neq 1$

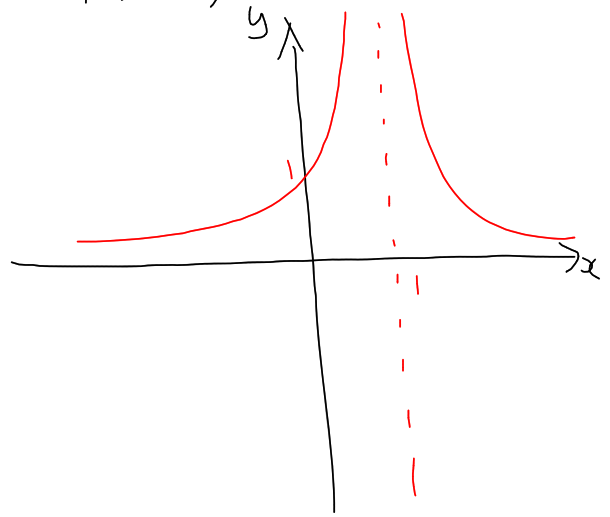
$$\underline{\underline{x > 1}}, |x-1| = x-1$$

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

$$\underline{\underline{x < 1}}, |x-1| = -(x-1)$$

$$= 1-x$$

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



$$18b) \quad \left| x + \frac{1}{x} \right| < 2x$$

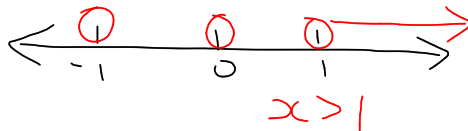
$$x + \frac{1}{x} < 2x \quad \text{or} \quad -\left(x + \frac{1}{x}\right) < 2x$$

$$\frac{1}{x} < x$$

$$x \neq 0 \quad \frac{1}{x} = x$$

$$x^2 = 1$$

$$x = \pm 1$$



$$-\left(x + \frac{1}{x}\right) < 2x$$

$$-x - \frac{1}{x} < 2x$$

$$-\frac{1}{x} < 3x$$

$$\frac{1}{x} > -3x$$

$$x \neq 0 \quad \frac{1}{x} = -3x$$

$$-3x^2 = 1$$

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

NO SOLUTIONS

$$\underline{\underline{\therefore x > 1}}$$

$$19 \quad y = |x+1| - |x-3|$$

$$\underline{x \leq -1}$$

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

$$y = -x - 1 + x - 3$$

$$y = -4$$

$$\underline{-1 < x < 3}$$

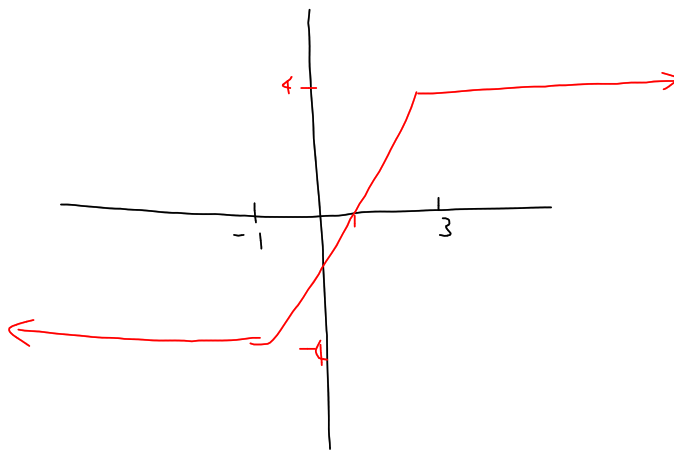
$$y = x+1 - -(x-3)$$

$$y = 2x - 2$$

$$\underline{x \geq 3}$$

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

$$y = 4$$



$$19b) \quad y = |x-2| + |x+1| - 4$$

$$\underline{x \leq -1}$$

$$y = -(x-2) - (x+1) - 4$$

$$y = -2x - 3$$

$$\underline{-1 < x < 2}$$

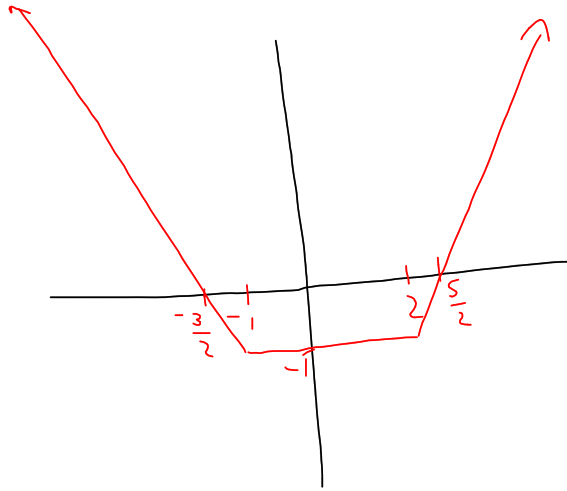
$$y = -(x-2) + x + 1 - 4$$

$$y = -1$$

$$\underline{x \geq 2}$$

$$y = (x-2) + (x+1) - 4$$

$$y = 2x - 5$$



$$19c) \quad y = 2|x+1| - |x-1| - 1$$

$$x \leq -1$$

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

$$y = -2x - 2 + x - 1 - 1$$

$$\underline{y = -x - 4}$$

$$-1 < x < 1$$

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

$$y = 2x + 2 + x - 1 - 1$$

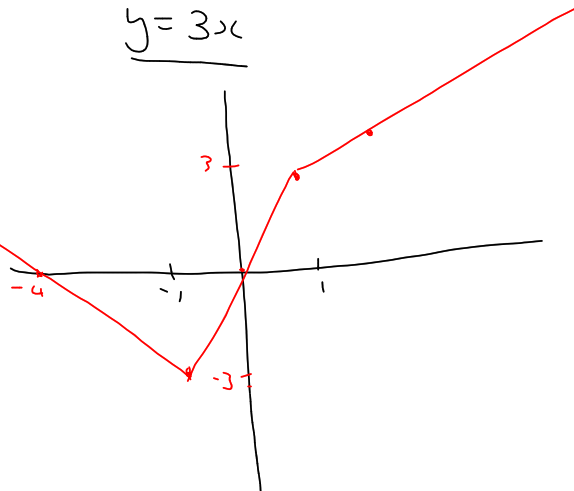
$$\underline{y = 3x}$$

$$x \geq 1$$

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

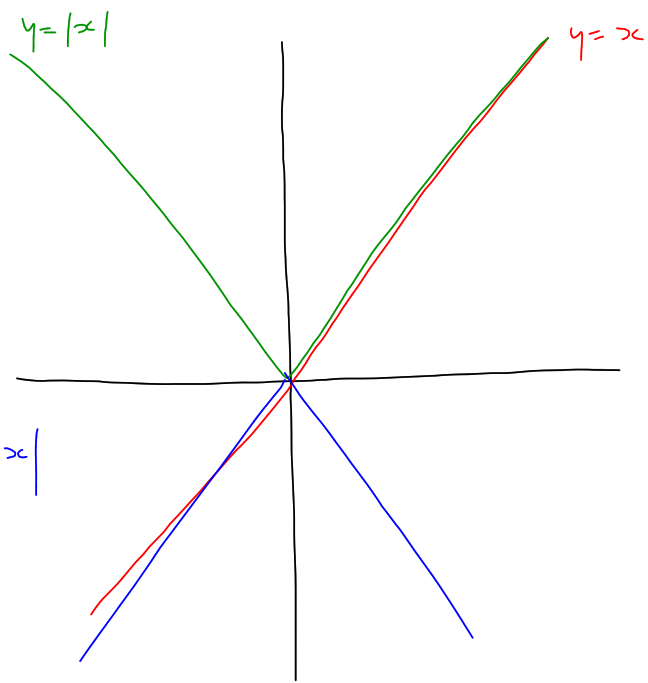
$$y = 2x + 2 - x + 1 - 1$$

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



21,

$$|y| = |x|$$
$$y = |x|$$
$$|y| = |x|$$
$$y = |x|$$
$$-y = |x| \Rightarrow y = -|x|$$



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

$$y = (|x+1|)(|x+2|)(|x+3|)$$

