

$y = \frac{|x|+1}{|x|-2} \rightarrow \frac{x+1}{x-2}$
 $Rf: (1, \infty) \cup (-\infty, -\frac{1}{2}]$

$y = \frac{x^2+1}{|x|} = |x| + \frac{1}{|x|} \rightarrow Rf: [1, +\infty)$

$y = \frac{x^2+kx-2}{x+3} \xrightarrow{+\infty} \frac{+\infty^2}{\infty} = +\infty$
 $\xrightarrow{-\infty} \frac{(-\infty)^2}{-\infty} = -\infty$
 $\rightarrow (kx+2)(x+3) - (x^2+kx-2) = 0$
 $(kx+2)(x+3) = x^2+kx-2$
 $kx^2+1x+4-x^2-kx+2 = x^2+4x+1 = (x+2)(x+1) \rightarrow -2$
 $\rightarrow -1$
 $Rf: \mathbb{R} - (-2, -1)$

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

$f(x) = 1 - \frac{\frac{1}{2}}{x^2-x+1} = 1 - \frac{\frac{1}{2}}{\frac{1}{2}(x^2-x+1)} \xrightarrow{+\infty} 1 \rightarrow -\frac{1}{2}(x^2-x+1) = 0$
 $x = \frac{1}{2}$
 $1 - \frac{\frac{1}{2}}{\frac{1}{2}(\frac{1}{4})} = 1 - 1 = 0$
 $Rf: [0, 1)$

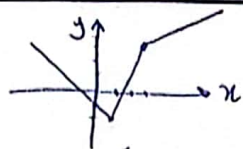
$y = \sqrt{-x^2+2x-1} \xrightarrow{x_s = \frac{-b}{2a}} \frac{-(-2)}{2(-1)} = 1$
 $y_s = \sqrt{-1+2-1} = \sqrt{0} = 0$
 $Rf: [0, 1]$

$y = \sqrt[3]{x^2-1} \xrightarrow{x_s = \frac{-b}{2a}} \frac{-(-1)}{2(1)} = \frac{1}{2}$
 $y_s = \sqrt[3]{(\frac{1}{2})^2-1} = \sqrt[3]{-\frac{3}{4}} = -\sqrt[3]{\frac{3}{4}}$
 $Rf: [-\sqrt[3]{\frac{3}{4}}, 0]$

$y = \log(x^2-x+1)$
 $\rightarrow x^2-x+1 > 0 \rightarrow \Delta = (-1)^2 - 4(1)(1) = -3 < 0$
 $\rightarrow Rf: \mathbb{R}$

$y = \log(x + \frac{1}{x})$
 $x + \frac{1}{x} > 0 \rightarrow x > 0$
 $Rf: (0, +\infty)$

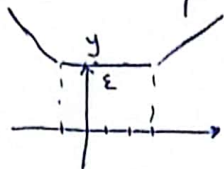
$$\text{و) } y = |x-1| - |x-2|$$



$$R_{f(n)} = [-1, 1)$$

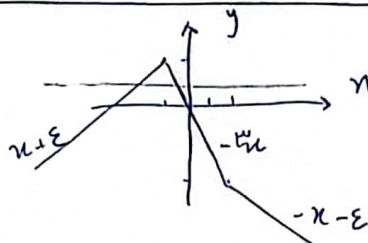
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$$\text{ب) } y = |x-1| + |x+1|$$



$$R_{f(n)} = [2, \infty)$$

$$|x-1| - |x+1| \leq 1$$



$$-x+1 = 1 \quad x = 0$$

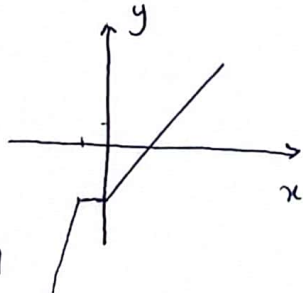
$$x+1 = 1 \quad x = 0$$

$$R = (-\infty, 0]$$

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$$y = x - |x+1| + |x|$$

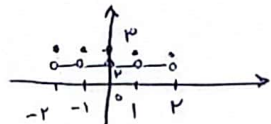
$$\begin{cases} x \geq 0; & x - x - 1 + x = x - 1 \\ -\frac{1}{x} < x < 0; & x - x - 1 - x = -1 \\ x \leq -\frac{1}{x}; & x + x + 1 - x = x + 1 \end{cases}$$



$$R_{f(n)} = \mathbb{R}$$

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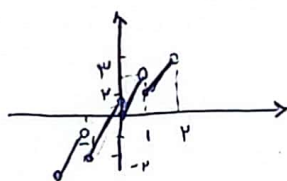
$$\text{الف) } f = [n] + [x-n] = [n] + [-n] + x$$



$$R_{f(n)} = \{x, y\}$$

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$$\text{ب) } f_n = [x]$$



$$R_{f(n)} = [-\varepsilon, \varepsilon)$$

$$\text{ج) } S_{\text{lim}} \begin{cases} (-1)^n - (-1) + 1 = 1 \\ (\frac{1}{n})^n - (\frac{1}{n}) + 1 = \frac{1}{n} \\ \rightarrow 1 \quad (1)^n - (1) + 1 = 1 \end{cases}$$

$$R_{f(n)} = [\frac{1}{n}, 1]$$

$$\text{ب) } S_{\text{lim}} \begin{cases} (1)^n + 1 + 1 = 2 \\ (0)^n + (0) + 1 = 1 \\ \rightarrow \frac{b}{n} = \frac{1}{n} < 0 \end{cases}$$

$$R_{f(n)} = [1, 2]$$

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