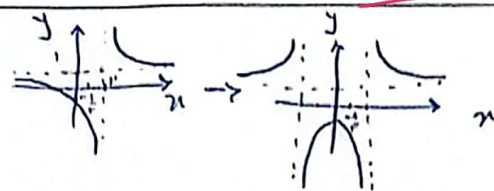


$y = \frac{|x|+1}{|x|-2} \rightarrow \frac{x+1}{x-2}$

 $Rf. (1, \infty) \cup (-\infty, -1]$

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

$y = \frac{x^2+kx-2}{x+3} \xrightarrow{+\infty} \frac{+\infty^2}{\infty} = +\infty$
 $\xrightarrow{-\infty} \frac{(-\infty)^2}{-\infty} = -\infty$

$(kx+2)(x+3) - (x^2+kx-2) = 0$
 $(kx+2)(x+3) = x^2+kx-2$
 $kx^2 + 1x + 4 - x^2 - kx + 2 = x^2 + 4x + 1 - x^2 - kx + 2 = 4x + 1 - kx + 2 = (4-k)x + 3 = 0$
 $\rightarrow x = \frac{-3}{4-k}$
 $Rf. IR - (-2, -6) \rightarrow$ اینجا اویه!

$f_{\text{con}} = \frac{x^2 - x + \frac{1}{2}}{x^2 - x + 1} \rightarrow$ صفر ندارد $f_{\text{con}} = IR$

$f_{\text{con}} = 1 - \frac{\frac{1}{2}}{x^2 - x + 1} = 1 - \frac{1}{2(x^2 - x + 1)}$
 $\xrightarrow{+\infty} = 1 \rightarrow -\frac{1}{2}(x^2 - x + 1) = 0 \rightarrow x = \frac{1}{2}$
 $1 - \frac{1}{2(\frac{1}{4})} = 1 - 1 = 0$
 $Rf. [0, 1)$

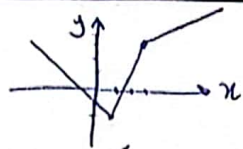
$y = \sqrt{-x^2 + 4x - 1}$ $x_s = \frac{-b}{2a} = \frac{-(-4)}{2(-1)} = -2$
 $y_s = \sqrt{-(-2)^2 + 4(-2) - 1} = \sqrt{-4 - 8 - 1} = \sqrt{-13}$ (Not real)
 $Rf. [0, 1]$

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

$y = \log(x^2 - x + 1)$ $x^2 - x + 1 > 0$
 $\rightarrow x^2 - x + 1 > 0 \rightarrow \Delta = 1 - 4 = -3 < 0$
 $\rightarrow Rf. = IR$

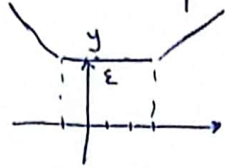
$y = \log(x + \frac{1}{x})$ $x + \frac{1}{x} > 0$
 $x > 0 \rightarrow x + \frac{1}{x} > 0$
 $x < 0 \rightarrow x + \frac{1}{x} < 0$
 $Rf. = [1, +\infty)$

و) $y = |x-1| - |x-2|$



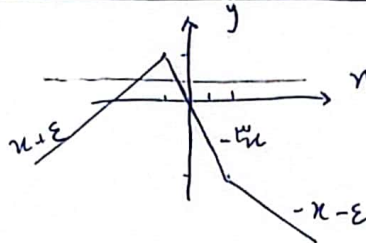
$R_{f_{\lim}} = [-1, 1]$

ب) $y = |x-1| + |x+1|$



$R_{f_{\lim}} = [2, \infty)$

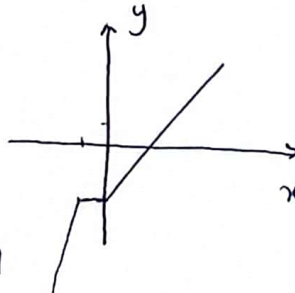
$|x-1| - |x+1| \leq 1$



$-x+1 = 1 \Rightarrow x = 0$
 $x+1 = 1 \Rightarrow x = 0$
 $-x-1 = 1 \Rightarrow x = -2$
 $R = (-2, \frac{1}{2})$

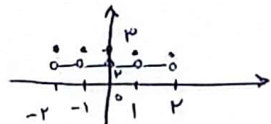
$y = x - |x+1| + |x|$

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



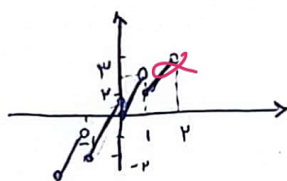
$R_{f_{\lim}} = \mathbb{R}$

الف) $f = [x] + [x-1] = [x] + [-x] + 1$



$R_{f_{\lim}} = \{1, 2\}$

ب) $f(x) = [x]$



$R_{f_{\lim}} = [-1, 1]$
 $[-1, 1]$

انت) $S_{\lim} \xrightarrow{-1} \frac{b}{a} \quad (-1)^n - (-1) + 1 = 1$
 $\xrightarrow{-\frac{1}{x}} \frac{b}{a} \quad (\frac{1}{x})^n - (\frac{1}{x}) + 1 = \frac{1}{x}$
 $\xrightarrow{1} \quad (1)^n - (1) + 1 = 1$

$R_{f_{\lim}} = [\frac{1}{x}, 1]$ رفت!

ب) $S_{\lim} \xrightarrow{1} \frac{b}{a} \rightarrow (1)^n + 1 + 1 = 2$
 $\xrightarrow{-\frac{b}{a}} \frac{b}{a} \rightarrow (0)^n + (0) + 1 = 1$
 $\xrightarrow{-\frac{b}{a}} \frac{b}{a} \rightarrow \frac{1}{x} < 0$

$R_{f_{\lim}} = [1, 2]$

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-2

$$y^2 + 12y = x^2 + 12x - 2 \rightarrow x^2 + (12-y)x - 2 - 12y = 0$$

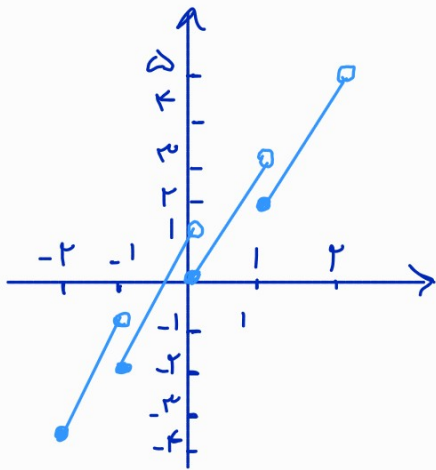
$$x = \frac{y-12 \pm \sqrt{(12-y)^2 - 4(-2-12y)}}{2} = \frac{y-12 \pm \sqrt{y^2 + 12y + 12}}{2}$$

$$\Delta \geq 0 \rightarrow y^2 + 12y + 12 \geq 0 \rightarrow \frac{-4}{+} \frac{-2}{-} \frac{-1}{+} \quad R_y = (-\infty, -4] \cup [-2, +\infty)$$

الف) $\max \left| \begin{array}{l} -\frac{b}{2a} = 1 \\ y = 3 \end{array} \right| \Rightarrow R_y = \sqrt{(-\infty, 3]} = [0, \sqrt{3}]$

-3

ب) $\min \left| \begin{array}{l} -\frac{b}{2a} = 1 \\ y = -1 \end{array} \right| \Rightarrow R_y = \sqrt{[-1, +\infty)} = [-1, +\infty)$



$$R_y = [-1, \infty)$$

ب-4