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الف) $y = \frac{|x|+1}{|x|-2} \rightarrow |x| = \frac{y+1}{y-1} \rightarrow \frac{-\frac{1}{2}}{+\frac{1}{2}-\frac{1}{2}+} \rightarrow R_f = (-\infty, -\frac{1}{2}] \cup (\frac{1}{2}, +\infty)$ (۲)

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

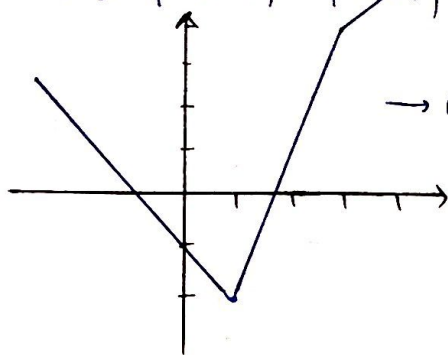
$y = \frac{x^2+2x-2}{x+2} \rightarrow yx+2y = x^2+2x-2 \rightarrow x^2+(2-y)x-(2+2y)=0$ (۲)
 $\rightarrow x = \frac{(y-2) \pm \sqrt{(y-2)^2+4(2+2y)}}{2} \rightarrow y^2+4y+12 \geq 0$
 $\rightarrow R_f = (-\infty, -2] \cup [-2, +\infty)$

$f_{(n)} = \frac{x^2-x+\frac{1}{2}}{x^2-x+1} \rightarrow yx^2-yx+y = x^2-x+\frac{1}{2}$ (۲)
 $\rightarrow (y-1)x^2+(1-y)x+(y-\frac{1}{2})=0 \rightarrow x = \frac{(y-1) \pm \sqrt{(y-1)^2-4(y-\frac{1}{2})(y-1)}}{2y-2}$
 $\rightarrow \begin{cases} -4y^2+4y \geq 0 \rightarrow 0 \leq y \leq 1 \\ y \neq 1 \end{cases} \rightarrow R_f = [0, 1) \checkmark \quad D_f = \mathbb{R} \checkmark$

الف) $y = \sqrt{-x^2+2x-1} \rightarrow y_{\max} = 2 \rightarrow R_f = [0, 2] \checkmark$ (۲)
 $\rightarrow y = \sqrt{2x^2-4x} \rightarrow y_{\min} = -2 \rightarrow R_f = [-2, +\infty)$ ۴

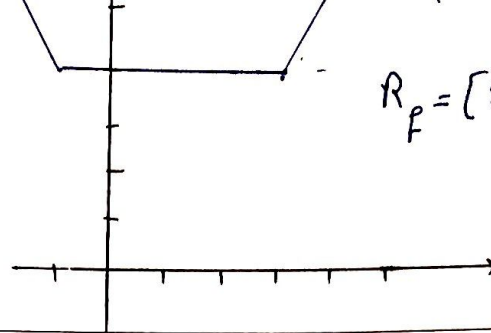
الف) $y = \log(x^2-x+1) \rightarrow R_{(x^2-x+1)} = \mathbb{R} \xrightarrow{\log} R_f = \mathbb{R} \checkmark$ (۲)
 $\rightarrow y = \log_r\left(\frac{x^2+1}{x}\right) \rightarrow R_{\left(\frac{x^2+1}{x}\right)} = (-\infty, -2] \cup [2, +\infty) \xrightarrow{\log} R_f = [1, +\infty) \checkmark$ ۵

الف) $y = |x-2| - |x-3|$



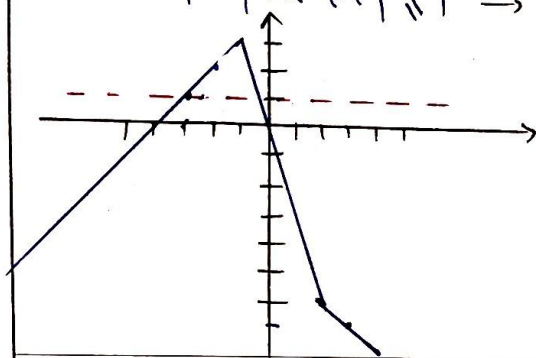
$\rightarrow R_f = [-2, +\infty)$

ب) $y = |x-3| + |x+1|$



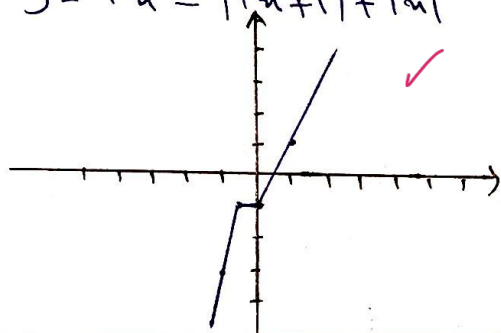
$R_f = [\varepsilon, +\infty)$

$|x-2| - |x+2| \leq 1 \rightarrow x = \mathbb{R} - (-\frac{3}{2}, \frac{1}{2})$



$\begin{matrix} -1 & & 2 \\ x + \varepsilon \leq 1 & | & -3x \leq 1 & | & -x - \varepsilon \leq 1 \\ x \leq -2 & & x \geq -\frac{1}{3} & & x \geq \varepsilon \end{matrix}$
 $\rightarrow \mathbb{R} - (-\frac{3}{2}, -\frac{1}{2})$

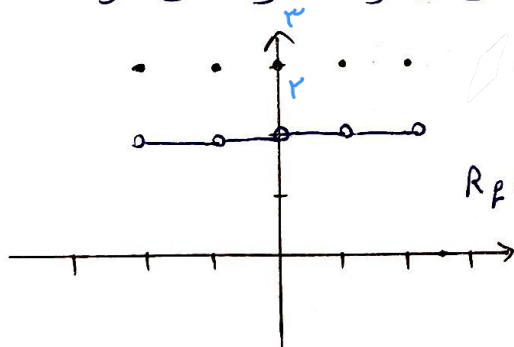
$y = 3x - |x+1| + |x|$



$\begin{matrix} -\frac{1}{2} & & 0 \\ x+1 & | & -1 & | & x-1 \end{matrix}$

$\rightarrow R_f = \mathbb{R}$

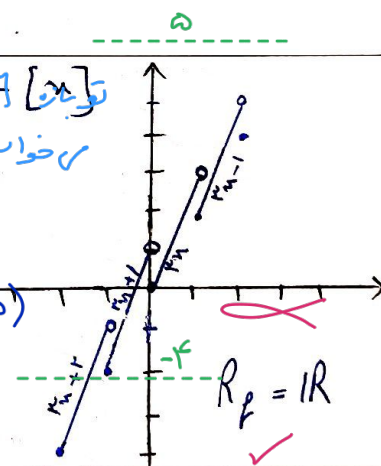
$y = [x] + [3-x] = [x] + [-x] + 3$



$R_f = \{2, -2\}$

$y = [x] + [3-x] = [x] + [-x] + 3$

$R_f = [1, 5]$



$R_f = \mathbb{R}$

الف) $y = \sin^2 x - \sin x + 1$

$\begin{cases} \sin x = 1 \rightarrow y = 1 \\ \sin x = -1 \rightarrow y = 3 \\ \sin x = \frac{1}{2} \rightarrow y = \frac{3}{2} \end{cases} \rightarrow R_f = [\frac{3}{2}, 3]$

ب) $y = \sin^2 x + \sin x + 1$

$\begin{cases} \sin^2 x = 0 \rightarrow y = 1 \\ \sin^2 x = 1 \rightarrow y = 3 \\ \sin^2 x = -\frac{1}{2} \times \end{cases} \rightarrow R_f = [1, 3]$