

الف) $\frac{1}{x-1} = \frac{1}{x-1} \Rightarrow \frac{1}{x-1} = \frac{1}{x-1} \Rightarrow R_f = (-\infty, 1) \cup (1, +\infty)$

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ب) $\frac{1}{x} + \frac{1}{x} = \frac{2}{x} \Rightarrow R_f = [2, +\infty)$

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$y = \frac{x^2 + 2x - 2}{x + 2} \Rightarrow xy + 2y = x^2 + 2x - 2 \Rightarrow x^2 + (2-y)x - 2 = 0$

$x = \frac{-2 + \sqrt{4 + 4(y+2)}}{2} = \frac{-2 + \sqrt{4y + 12}}{2} \Rightarrow y^2 + 12y + 12 \geq 0$
 $(y+6)(y+2) \geq 0$
 $y \geq -2 \cup y \leq -6 \Rightarrow R_f = (-\infty, -6] \cup [-2, +\infty)$

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الف) $x^2 - x + 1 = 0$ $\Rightarrow R_f = \mathbb{R}$
 ب) $\frac{(x-1)^2}{(x-1)^2 + 5} \Rightarrow \frac{(x-1)^2}{(x-1)^2 + 5} \Rightarrow R_f = [0, 1]$

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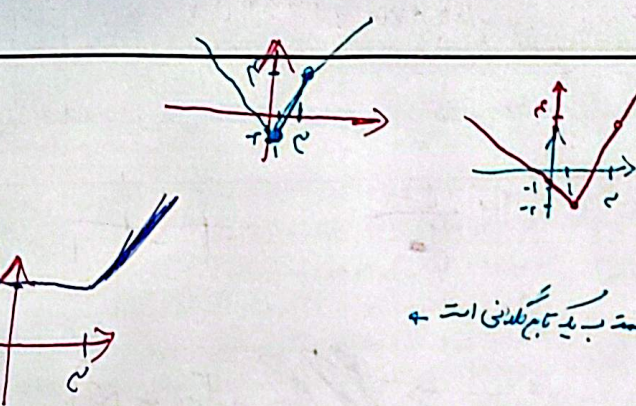
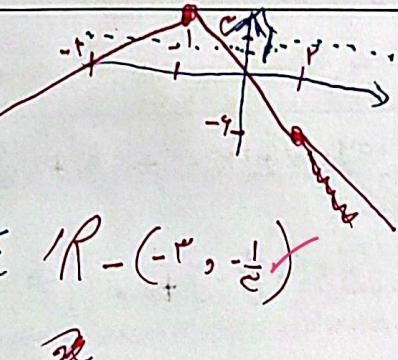
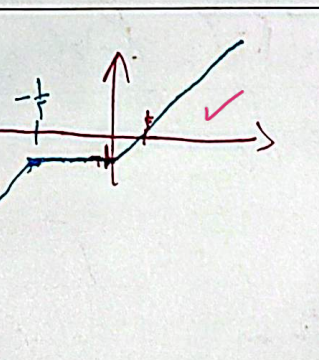
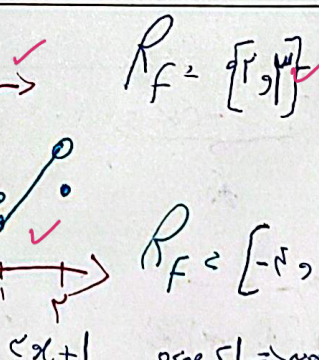
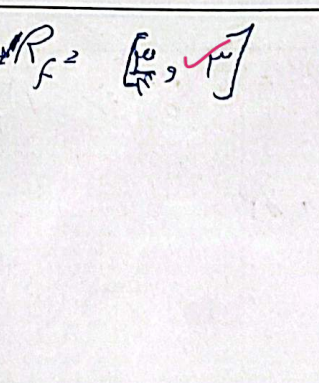
الف) $\frac{1}{\sqrt{x}} \Rightarrow R_f = (-\infty, 0) \cup (0, +\infty)$
 ب) $\frac{1}{\sqrt{x^2 - 1}} \Rightarrow R_f = (-\infty, -1) \cup (-1, 1) \cup (1, +\infty)$

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الف) $\log(x^2 + 1) \Rightarrow R_f = \mathbb{R} \Rightarrow \log \Rightarrow R_f = \mathbb{R}$

ب) $\log\left(\frac{x^2 + 1}{x}\right) \Rightarrow \log \Rightarrow R_f = [1, +\infty)$

الف) $\frac{1}{x-1}$ $\frac{2}{x-5}$ $\frac{1}{x+1}$ $R_f = [-5, +\infty)$ ✓ ب) $R_f = [5, +\infty)$ ✓	 ۶
الف) $\frac{1}{x+2}$ $\frac{-2}{x}$ $\frac{-1}{x-2}$ $\begin{cases} x \neq -2 \\ x \neq -\frac{1}{2} \end{cases} \rightarrow x \in \mathbb{R} - (-2, -\frac{1}{2})$	 ۷
$x_0: \frac{-1}{x+1}$ $\frac{0}{x-1}$ $\frac{1}{x-1}$ $y_0: -1$ $y_0: -1$ $y_0: 1$ $R_f = \mathbb{R}$ ✓	 ۸
الف) $y = [x] + [2-x]$ ب) $y = [x] + [2-x] + c$ ج) $y = c[x] - [x]$ $-[x] \leq -1 \Rightarrow c[x] + 1$ $-1 \leq [x] \leq 0 \Rightarrow c[x] + 1$ $0 \leq [x] \leq 1 \Rightarrow c[x]$ $1 \leq [x] \leq 2 \Rightarrow c[x] - 1$	 $R_f = [2, 3]$ ✓ $R_f = [-1, 1]$ ✓ ۹
الف) $y = \sin^2 x - \sin x + 1$ ب) $y = \sin^2 x + \sin^2 x + 1$	 $R_f = [\frac{1}{4}, \frac{5}{4}]$ ✓ $R_f = [1, 3]$ ✓ ۱۰