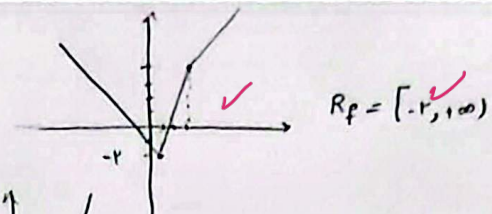


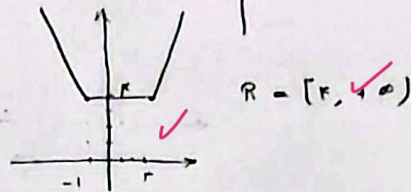
الف) $y = \frac{ x +1}{ x -2} \Rightarrow y x - 1y = x +1 \rightarrow y x - x = 1+y = x (y-1)$ $\Rightarrow x = \frac{1+y}{y-1} \rightarrow x \geq 0 \Rightarrow \frac{1+y}{y-1} \geq 0 \rightarrow \frac{1}{y-1} \geq -1 \rightarrow R_f = \mathbb{R} - (\frac{1}{2}, 1)$ ب) $y = \frac{x^2+1}{ x } \rightarrow y = x + \frac{1}{ x } \rightarrow x > 0 \Rightarrow R_f = [1, +\infty)$	۱
$y = \frac{x^2+2x-2}{x+2} \Rightarrow yx + 2y = x^2+2x-2 \rightarrow x^2 + (2-y)x - (2+2y) = 0$ $\rightarrow \Delta = (2-y)^2 - 4(1)(-(2+2y)) = 4 - 4y + y^2 + 8y + 8 = y^2 + 4y + 12 = (y+2)(y+4)$ $\rightarrow x = \frac{y-2 \pm \sqrt{y^2+4y+12}}{2} \Rightarrow y^2 + 4y + 12 \geq 0 \Rightarrow (y+2)(y+4) \geq 0$ $\rightarrow \frac{-4}{2} \leq y \leq \frac{-2}{2} \Rightarrow R_f = \mathbb{R} - (-4, -2)$	۲
$D_f: x^2 - x + 1 \neq 0 \rightarrow \Delta = 1 - 4 = -3 \rightarrow$ همیشه مثبت $\rightarrow D_f = \mathbb{R}$ $y = \frac{x^2-x+\frac{1}{x}}{x^2-x+1} \rightarrow yx^2 - yx + y = x^2 - x + \frac{1}{x} \rightarrow x^2(1-y) + x(y-1) + \frac{1}{x} - y$ $\Delta = (y-1)^2 - 4(\frac{1}{x}-y)(1-y) = (y-1)^2 + (4y-1)(1-y) = y^2 - 2y + 1 + 4y - 1 - 4y^2 = -3y^2 + 4y$ $= -3y^2 + 4y \geq 0 \rightarrow y(4-3y) \geq 0 \rightarrow 0 \leq y \leq \frac{4}{3}$ $\rightarrow R_f = [0, \frac{4}{3}]$	۳
الف) $y = \sqrt{-x^2+4x-1} \rightarrow$ برد: $-x^2+4x-1 \geq 0 \rightarrow -x^2+4x-1 = 0 \rightarrow x = \frac{-4 \pm \sqrt{16-4}}{-2} = \frac{-4 \pm \sqrt{12}}{-2} = \frac{-4 \pm 2\sqrt{3}}{-2} = 2 \pm \sqrt{3}$ $\rightarrow R = (-\infty, 2-\sqrt{3}] \rightarrow \sqrt{(-\infty, 2-\sqrt{3}]} = [-\sqrt{3}, 2-\sqrt{3}] \Rightarrow R_f = [-\sqrt{3}, 2-\sqrt{3}]$ ب) چنانچه دهم نداشت پس محدودیتی روی عبارت زیر آن وجود ندارد پس هر مقدار از عبارت زیر آن قابل قبول است و داریم: $y = \frac{x^2-2x}{x^2-2x+1} \rightarrow \frac{-b}{2a} = \frac{2}{2} = 1 \rightarrow 1-1 = 0 \rightarrow R = [-1, 1]$ $\rightarrow \sqrt{[-1, 1]} = [-1, 1] \Rightarrow R_f = [-1, 1]$	۴
الف) برد: $x^2 - x + 1 \rightarrow$ بزرگترین دهم فرد $\rightarrow R = \mathbb{R}$ $\rightarrow y = \log(x^2 - x + 1) = \log \mathbb{R} \rightarrow \log(0, +\infty) \rightarrow R_f = \mathbb{R}$ ب) برد: $\frac{x^2+1}{x} = x + \frac{1}{x} \Rightarrow R = (-\infty, -2] \cup [2, +\infty)$ $\rightarrow y = \log_r(\frac{x^2+1}{x}) = \log_r(-\infty, -2] \cup [2, +\infty) = \log_r[2, +\infty) \Rightarrow R_f = [1, +\infty)$	۵

$$\text{الف) } \begin{cases} x \geq 1 \rightarrow x - 2 - x + 1 = x + 1 \\ 1 \leq x \leq 1 \rightarrow x - 2 + x - 1 = 2x - 3 \\ x \leq 1 \rightarrow x - 2x + x - 1 = -x - 1 \end{cases} \rightarrow$$



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ب) تابع مداری: $x \geq 1, -1, 2 \rightarrow$



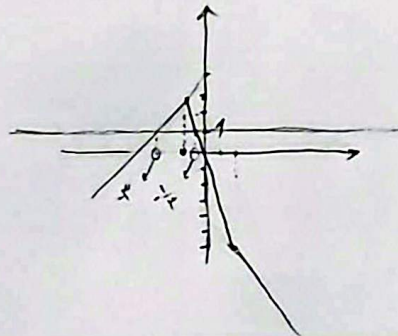
$$y = |x-2| - |2x+2|$$

$$\begin{cases} x \geq 2 & x-2-2x-2 = -x-4 \\ -1 \leq x \leq 2 & 2-x-2x-2 = -3x \\ x \leq -1 & 2-x+2x+2 = x+4 \end{cases}$$

$$-x-4 = 1 \rightarrow x = -5$$

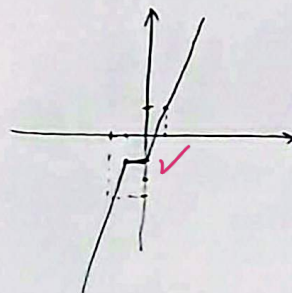
$$x+4 = 1 \rightarrow x = -5$$

$$\Rightarrow \text{مجموعه جواب} = \mathbb{R} - (-5, \frac{1}{3})$$



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$$\begin{cases} x \geq 0 & x-2x-1+x = x-1 \\ -\frac{1}{2} \leq x \leq 0 & x-2x-1-x = -1 \\ x \leq -\frac{1}{2} & x+2x+1-x = x+1 \end{cases}$$

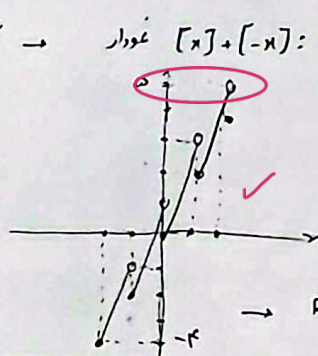


$$R_f = \mathbb{R}$$

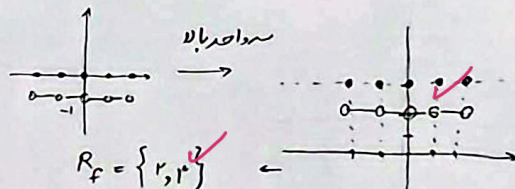
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$$\text{الف) } y = [x] + [-x] + 2 \rightarrow \text{نمودار } [x] + [-x]:$$

$$\begin{aligned} [-2, -1) &\rightarrow x+2 \\ [-1, 0) &\rightarrow x+1 \\ [0, 1) &\rightarrow x \\ [1, 2) &\rightarrow x-1 \\ \{2\} &\rightarrow x-2 \end{aligned}$$



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



$$R_f = \{2, 1\}$$

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$$y = \sin^2 x - \sin x + 1 : -1 \leq \sin x \leq 1 \rightarrow \sin x = 1 : y = 1$$

$$\sin x = -1 : y = 3$$

$$\rightarrow R_f = [\frac{1}{2}, 3]$$

$$-\frac{b}{2a} = \frac{1}{2} \rightarrow \sin x = \frac{1}{2} \rightarrow y = \frac{1}{4} - \frac{1}{2} + 1 = \frac{3}{4}$$

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$$\text{ب) } y = \sin^2 x + \sin x + 1 : 0 \leq \sin x \leq 1 \rightarrow \sin x = 1 \rightarrow y = 3$$

$$\sin x = 0 \rightarrow y = 1$$

$$\rightarrow R_f = [1, 3]$$

$$-\frac{b}{2a} = -\frac{1}{2} \rightarrow \sin x \neq -\frac{1}{2}$$