

$$y = \frac{x^2 + x + 2}{x-1} \rightarrow yx - y = x^2 + x + 2 \rightarrow x^2 + (1-y)x + y+2 = 0$$

$$\Delta \geq 0 \rightarrow (1-y)^2 - 4(y+2) \geq 0 \rightarrow y^2 - 6y - 7 \geq 0$$

$$R_f = (-\infty, -1] \cup [7, +\infty)$$

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الف) $2x^2 - 5x + 1$ $\rightarrow R_f = [-\frac{5}{4}, +\infty)$

$-\frac{\Delta}{4a} = -\frac{19}{4} \rightarrow R_f = [-\frac{19}{4}, +\infty)$

ب) $\sqrt{-x^2 + 6x - 5}$ $\rightarrow R_f = [0, \sqrt{\frac{\Delta}{4a}}] = [0, 2]$

ج) $\sqrt{x^2 - 2x^2 + 4x + 1}$ $\rightarrow R_f = [0, +\infty)$

د) $\log(x^2 - 5x^2 + 7x + 4)$ $\rightarrow R_f = R$

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الف) $\frac{3x+1}{2x-5}$ $\rightarrow R_f = R - \{\frac{3}{2}\} = R - \{f\}$

ب) $y = \sqrt{\frac{4x+1}{x-2}}$ $\rightarrow y^2 = \frac{4x+1}{x-2} \rightarrow x = \frac{2y^2+1}{y^2-4} \rightarrow y \neq 2 \rightarrow R_f = [0, +\infty)$

ج) $y = \frac{x^2+2x+1}{\sqrt{x^2+3}} = \sqrt{x^2+3} + \frac{1}{\sqrt{x^2+3}} \rightarrow \sqrt{x^2+3} \geq \sqrt{3} \rightarrow y_{\min} = \frac{4}{3}\sqrt{3}$

$\rightarrow R = [\frac{4}{3}\sqrt{3}, +\infty)$

د) $x^2 + \frac{1}{x^2+4} - f \rightarrow x^2 + 4 \geq f \rightarrow y_{\min} = \frac{1}{f}$

$\rightarrow R = [\frac{1}{f}, +\infty)$

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$\frac{3x^2+5x}{x^2-1} \rightarrow x^2 = \frac{y+4}{y-3} \rightarrow R = [\frac{1}{f}, +\infty)$

$\rightarrow R = (-\infty, -f] \cup (3, +\infty)$

د) $y^2 \geq 0 \rightarrow \begin{cases} x^2 = 0 \rightarrow y = 4 \\ x^2 \rightarrow +\infty \rightarrow \lim_{x \rightarrow \infty} \frac{3x^2+4}{x^2-1} = 3 \end{cases}$

$\rightarrow R_f = (-\infty, -f] \cup (3, +\infty)$ $\rightarrow$ مخرج صفر نشود

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$y = \frac{2\sin y - 1}{\sin y + 3}$ $\rightarrow \sin y = \frac{y+1}{y-2} \rightarrow 1 \geq \frac{y+1}{y-2} \geq -1$

$\rightarrow R_f = [-\frac{3}{4}, \frac{1}{4}]$

د) $-1 \leq \sin y \leq 1 \rightarrow \sin y = 1 \rightarrow y = \frac{1}{3}$

$\rightarrow \sin y = -1 \rightarrow y = -\frac{3}{4}$

$\rightarrow R_f = [-\frac{3}{4}, \frac{1}{3}]$

$\rightarrow$ مخرج صفر نشود

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پارامترهای دوارد همپیریکلیف

$$\frac{x^2 - x + \frac{1}{4}}{x^2 - x + 1} \rightarrow x^2 - x + 1 \neq 0 \rightarrow \Delta < 0 \rightarrow \boxed{Df = R}$$

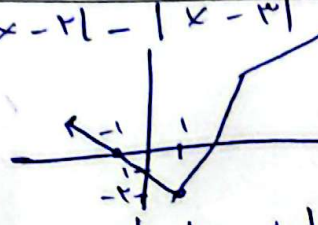
①

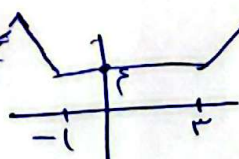
$$\frac{(x - \frac{1}{4})^2}{(x - \frac{1}{4})^2 + \frac{3}{4}} \rightarrow \text{صورت نامنفی} \rightarrow Rf = [0, 1]$$

مخرج مثبت

همپرفکت صورت و مخرج برابر نمی شود

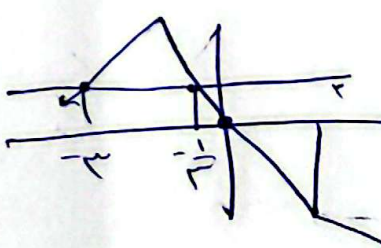
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الف) $|2x - 2| - |x - 3|$  $\rightarrow R = [-2, +\infty)$ مرتب نبوی!

ب) $|x - 3| - |x + 1|$  $\rightarrow Rf = [-4, +\infty)$

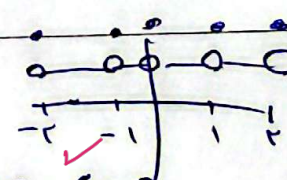
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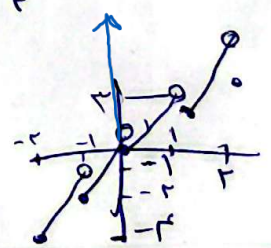
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$$|x - 2| - |2x + 2| \leq 1$$

 $\rightarrow (-\infty, -2] \cup [-\frac{1}{2}, +\infty)$

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الف) $\begin{cases} x \in \mathbb{Z} \\ x \notin \mathbb{Z} \end{cases}$  مرتب مثل بش

ب) $3x - [x]$ $\begin{cases} 2 \leq x < -1 & Rf = \{2, 3\} \\ -1 \leq x < 0 & \\ 0 \leq x < 1 & \\ 1 \leq x < 2 & \\ x = 2 & \end{cases}$ $\rightarrow \boxed{R = [-1, +\infty)}$ 

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$$y = \sin^2 - \sin + 1 \rightarrow y = t^2 - t + 1 \rightarrow \min = \frac{1}{4}$$

$$\sin t \rightarrow y_{\max} = 1 \rightarrow y_{\min} = \frac{3}{4} \rightarrow y_{\max} = 2 \rightarrow Rf = [\frac{3}{4}, 2]$$

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$$y = \sin^2 \sin^2 + 1 \rightarrow t^2 + t + 1$$

$$\sin^2 = t \rightarrow y_{\max} = 3 \rightarrow y_{\min} = 1 \rightarrow Rf = [1, 3]$$

