

الف) $y = x^2 - 5 \rightarrow x = \sqrt{y+5} \rightarrow y+5 \geq 0 \rightarrow y \geq -5 \Rightarrow R_f = [-5, +\infty)$

ب) $y = x^3 + 1 \rightarrow R_f = \mathbb{R}$

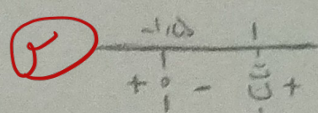
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الف) $y = x^2 - 4x + 4 \rightarrow y = (x-2)^2 + 2 \rightarrow \sqrt{y-2} = x-2 \rightarrow x = \sqrt{y-2} + 2 \rightarrow y-2 \geq 0 \rightarrow y \geq 2 \Rightarrow R_f = [2, +\infty)$

ب) $y = x^2 - 5x + 1 \rightarrow y = (x - \frac{5}{2})^2 + \frac{1}{4} \rightarrow \sqrt{y + \frac{1}{4}} = x - \frac{5}{2} \rightarrow x = \sqrt{y + \frac{1}{4}} + \frac{5}{2} \rightarrow y + \frac{1}{4} \geq 0 \rightarrow y \geq -\frac{1}{4} \Rightarrow R_f = [-\frac{1}{4}, +\infty)$

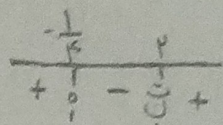
الف) $y = \frac{x^2 + 3}{x^2 - 2} \rightarrow yx^2 - 2y = x^2 + 3 \rightarrow x^2(y-1) = 3+2y \rightarrow x = \sqrt{\frac{3+2y}{y-1}}$

$R_f = (-\infty, -\frac{1}{2}] \cup (1, +\infty)$



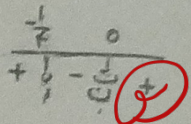
ب) $y = \frac{2|x|+1}{|x|-2} \rightarrow y(|x|-2) = 2|x|+1 \rightarrow |x|(y-2) = 1+2y \rightarrow |x| = \frac{1+2y}{y-2}$

$R_f = (-\infty, -\frac{1}{2}] \cup (2, +\infty)$



$y = \frac{1}{x^2 - 4x} \rightarrow yx^2 - 4xy = 1 \rightarrow yx^2 - 4xy - 1 = 0 \rightarrow \frac{4y \pm \sqrt{16y^2 + 4y}}{2y} \rightarrow y \neq 0, 16y^2 + 4y \geq 0, y(y+1) \geq 0$

$R_f = (-\infty, -\frac{1}{4}] \cup (0, +\infty)$



الف) $y = x^2 - 4x + 2 \rightarrow \text{ext} = \begin{cases} -\frac{b}{2a} \\ -\frac{\Delta}{4a} \end{cases} \sim \begin{cases} 2 \\ -2 \end{cases} \xrightarrow{\frac{a}{\min}} R_f = [-2, +\infty)$

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ب) $y = -x^2 + 4x + 2 \rightarrow \text{ext} = \begin{cases} -\frac{b}{2a} \\ -\frac{\Delta}{4a} \end{cases} \sim \begin{cases} 2 \\ 6 \end{cases} \xrightarrow{\frac{a}{\max}} R_f = (-\infty, 6]$

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الف) $y = \sqrt{x^2 - 4x + 2} \rightarrow \text{ext} = \begin{cases} -\frac{b}{2a} \\ -\frac{\Delta}{4a} \end{cases} \sim \begin{cases} 2 \\ -2 \end{cases} \xrightarrow{\frac{a}{\min}} R_f = \sqrt{[-2, +\infty)} = [0, +\infty)$

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ب) $y = \sqrt{-x^2 + 4x + 10} \rightarrow \text{ext} = \begin{cases} -\frac{b}{2a} \\ -\frac{\Delta}{4a} \end{cases} \sim \begin{cases} 2 \\ 14 \end{cases} \xrightarrow{\frac{a}{\max}} R_f = \sqrt{(-\infty, 14]} = [0, \sqrt{14}]$

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الف) $y = x^2 + 2x^2 + 2x + 1 \rightarrow R_f = \mathbb{R}$

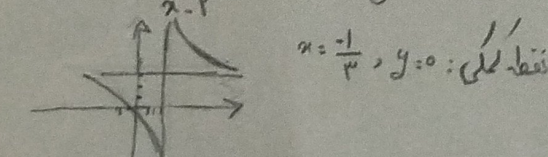
ب) $y = \sqrt{x^2 + 4x^2 + 4x + 1} \rightarrow R_f = \sqrt{\mathbb{R}} = [0, +\infty)$

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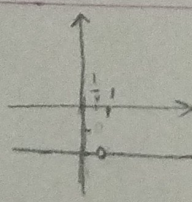
الف) $y = \frac{x+1}{x-2} \sim R_f = \mathbb{R} - \{2\}$ ب) $y = \sqrt{\frac{x+1}{x+3}} \sim R_f = \sqrt{\mathbb{R} - \{-3\}} = [0, +\infty) - \{1\}$

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الف) $y = \frac{x+1}{x-2} \quad x=2, y=2$ ب) $y = \frac{fx-2}{1-2x} = (-2)$



$D_f = \mathbb{R} - \{\frac{1}{2}\}$



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الف) $y = \cos^2 x + \frac{1}{\cos^2 x} \rightarrow R_2 [2, +\infty)$

ب) $y = \sqrt{\frac{x^2+1}{x}} \rightarrow (-\infty, -2] \cup [2, +\infty)$

$n > 0 \rightarrow \left(\sqrt[n]{2}, +\infty \right)$

$n < 0 \rightarrow \left(-\infty, \sqrt[n]{2} \right)$

$(1/\omega)$