

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

ب) $y = x^2 + 1 \rightarrow y - 1 = x^2 \rightarrow x = \pm \sqrt{y-1}$
 $R_f = \mathbb{R}$

الف) $\frac{-b}{2a} = \frac{f}{2} = 2 \quad y = x^2 - 4x + 4 = 2 \quad a > 0 \quad R_f = [2, +\infty)$

ب) $\frac{-b}{2a} = \frac{5}{2} \quad y = (\frac{5}{2})^2 - 5(\frac{5}{2}) + 1 = \frac{25}{4} - \frac{25}{2} + 1 = \frac{25}{4} - \frac{25}{2} + \frac{4}{4} = \frac{-21}{4}$
 $a > 0 \rightarrow R_f = [-\frac{21}{4}, +\infty)$

الف) $y = x^2 - 2y = x^2 + 2 \rightarrow y - x^2 = 2 \rightarrow x^2 = y - 2 \rightarrow x = \pm \sqrt{y-2}$

$\frac{y-2}{y-1} \geq 0 \rightarrow \frac{y-2}{y-1} \geq 0 \rightarrow R_f = (-\infty, \frac{2}{3}] \cup (1, +\infty)$

ب) $y|x| - 4y = 2|x| + 1 \rightarrow y|x| - 2|x| = 4y + 1 \rightarrow |x|(y-2) = 4y+1 \rightarrow |x| = \frac{4y+1}{y-2}$
 $x = \frac{4y+1}{y-2} \rightarrow \frac{4y+1}{y-2} \geq 0 \rightarrow R_f = (-\infty, \frac{1}{4}] \cup (2, +\infty)$

$y = \frac{1}{x^2 - 4x} \rightarrow y(x^2 - 4x) = 1 \rightarrow yx^2 - 4xy - 1 = 0$

$\Delta \geq 0 \rightarrow 16y^2 - 4(-1)(y) = 16y^2 + 4y \rightarrow x = \frac{4y \pm \sqrt{16y^2 + 4y}}{2y}$
 $\rightarrow R_f = (-\infty, \frac{1}{4}] \cup (0, +\infty)$

$\frac{1}{x^2 - 4x} = 0$

$\frac{1}{x^2 - 4x} = 0 \rightarrow$ $\frac{1}{x^2 - 4x}$ کی قیمتیں صفر نہیں ہوتیں

الف) $x^2 - 4x + 2 \quad a > 0 \rightarrow \min \quad \min \left| \frac{-b}{2a} = \frac{4}{2} = 2 \right|$
 $4 - 16 + 2 = -10$

$R_f = [-10, +\infty)$

ب) $-x^2 + 4x + 2 \rightarrow a < 0 \rightarrow \max \quad \max \left| \frac{-b}{2a} = \frac{-4}{-2} = 2 \right|$
 $-4 + 16 + 2 = 14$

$R_f = (-\infty, 14]$

الف) $y = \sqrt{x^2 - 4x + 1}$ $a > 0 \rightarrow \min$ $\min \left| \frac{b}{2a} = \frac{2}{1} = 2 \right|$
 $9 - (4 + 1) = -V$

$R_f = \sqrt{[L, V, +\infty)} \rightarrow [0, +\infty)$

ب) $y = \sqrt{-x^2 + 4x + 1}$ $a < 0 \rightarrow \max$ $\max \left| \frac{b}{2a} = \frac{-2}{-1} = 2 \right|$
 $-1 + 4 + 1 = 4$

$R_f = [-\infty, 14] \rightarrow (0, \sqrt{14}]$

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الف) $y = \sqrt{x^2 - 4x + 1}$ $\rightarrow$ فرد $R_f = R$

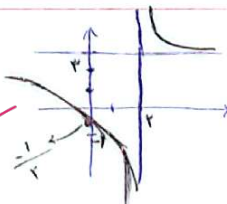
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ب) $y = \sqrt{-x^2 + 4x + 1}$ $\rightarrow$ زوج $R_f = \sqrt{R} = [0, +\infty)$

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

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

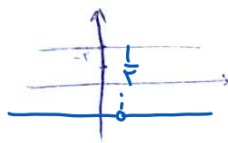
الف) $y = \frac{x+1}{x-2}$ $\rightarrow$ $\frac{b}{a} = \frac{1}{-1} = -1$
 $\frac{a}{c} = \frac{1}{-1} = -1$
 $x=0 \rightarrow \frac{-1}{-2} = \frac{1}{2}$



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ب) $y = \frac{x-2}{1-2x}$ $1-2x \neq 0 \rightarrow x \neq \frac{1}{2}$

$\lim_{x \rightarrow \frac{1}{2}} \frac{x-2}{1-2x} = -2$



$y = -2$ زیر محور x ها است

الف) $y = \cos^2 x + \frac{1}{\cos^2 x} \rightarrow \cos^2 x > 0$ $R_f = [2, +\infty)$

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ب) $y = \sqrt[3]{\frac{x^2+1}{x}}$ $\rightarrow \sqrt[3]{x + \frac{1}{x}}$ $x > 0$ و $x < 0$

$\rightarrow R_f = \sqrt[3]{(-\infty, x]} \cup [x, +\infty) \rightarrow R_f = (-\infty, \sqrt[3]{-2}] \cup [\sqrt[3]{2}, +\infty)$

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