

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

ب) $y = x^3 + 1 \Rightarrow x^3 = y - 1 \Rightarrow x = \sqrt[3]{y - 1} \rightarrow R_f = \mathbb{R}$

الف) $y = x^2 - 4x + 6$
 $y = (x - 2)^2 + 2 \Rightarrow \sqrt{(x - 2)^2} = \sqrt{y - 2}$
 $x - 2 = \pm \sqrt{y - 2} \Rightarrow x = \pm \sqrt{y - 2} + 2 \Rightarrow y - 2 \geq 0 \Rightarrow y \geq 2$
 $R_f = [2, +\infty)$

ب) $y = x^2 - 5x + 1 \Rightarrow y = x^2 - 5x + \frac{25}{4} - \frac{21}{4} \Rightarrow y = (x - \frac{5}{2})^2 - \frac{21}{4} \Rightarrow \sqrt{(x - \frac{5}{2})^2} = \sqrt{y + \frac{21}{4}}$
 $x - \frac{5}{2} = \pm \sqrt{y + \frac{21}{4}} \Rightarrow x = \pm \sqrt{y + \frac{21}{4}} + \frac{5}{2} \Rightarrow y + \frac{21}{4} \geq 0$
 $y \geq -\frac{21}{4} \Rightarrow R_f = [-\frac{21}{4}, +\infty)$

الف) $y = \frac{x^2 + 3}{x^2 - 1} \rightarrow x^2 y - 2y = x^2 + 3 \rightarrow x^2 y - x^2 = 3 + 2y$
 $x^2 (y - 1) = 3 + 2y \rightarrow \sqrt{x^2} = \sqrt{\frac{3 + 2y}{y - 1}} \rightarrow x = \sqrt{\frac{3 + 2y}{y - 1}}$
 $R_f = (-\infty, -\frac{3}{2}] \cup (1, +\infty)$

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

$$y = \frac{1}{n^2 - \epsilon n} \Rightarrow y n^2 - y n = 1 \rightarrow y n^2 - \epsilon y n - 1 = 0$$

$$n = \frac{-b \pm \sqrt{\Delta}}{2a} \Rightarrow \Delta = 14y^2 + \epsilon y \rightarrow$$

$$n = \frac{\epsilon y \pm \sqrt{14y^2 + \epsilon y}}{2y} \rightarrow 14y^2 + \epsilon y \geq 0 \rightarrow \epsilon y (\epsilon y + 14) \geq 0$$

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

الف) $n^2 - \epsilon n + 2$

$$Cxt \begin{cases} n = \frac{-b}{2a} = \frac{\epsilon}{2} = 2 \end{cases}$$

$$R_f = [-\sqrt{2}, +\infty)$$

$$R_f = (y_{min}, +\infty)$$

$\rightarrow y = -n^2 + \epsilon n + 2$

$$R_f = (-\infty, y_{max}]$$

$$R_f = (-\infty, 6]$$

$$Cxt \begin{cases} n = \frac{-b}{2a} = \frac{-\epsilon}{-2} = 2 \\ y = \frac{-\Delta}{\epsilon a} = -4 \end{cases}$$

الف) $\sqrt{n^2 - \epsilon n + 2}$

$$Cxt \begin{cases} n = \frac{-b}{2a} = \frac{\epsilon}{2} = 2 \end{cases}$$

$$R_f = \sqrt{[-\sqrt{2}, +\infty)}$$

$$\begin{cases} y = \frac{-\Delta}{\epsilon a} = -\sqrt{2} \end{cases}$$

$$R_f = [0, +\infty)$$

چون اعداد از اولیین عدد نامفید یعنی صفر شروع می شود

$\rightarrow y = \sqrt{-n^2 + \epsilon n + 1}$

$$Cxt \begin{cases} n = \frac{-b}{2a} = \frac{-\epsilon}{-2} = 1 \end{cases}$$

$$R_f = \sqrt{(-\infty, +1]}$$

$$\begin{cases} y = \frac{-\Delta}{\epsilon a} = -1\epsilon \end{cases}$$

$$R_f = [0, \sqrt{1\epsilon}]$$

الف) $y = x^5 + 3x^4 + 2x + 1$ $R_f = \mathbb{R}$ ۵

ب) $y = \sqrt{x^4 + 4x^2 + 4x + 1}$ $R_f = [0, +\infty)$ چون اعداد منفی جذر نمی دهند فقط + دارد برد مثبت

الف) $y = \frac{ax+b}{cx+d}$ $ad \neq cb \Rightarrow R_f = \mathbb{R} - \left\{ \frac{a}{c} \right\}$ ۶

$R_f = \mathbb{R} - \{3\}$

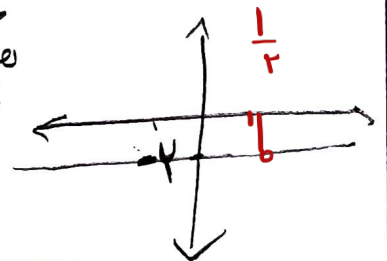
ب) $y = \sqrt{\frac{ax+b}{cx+d}}$ $R_f = [0, +\infty) - \left\{ \sqrt{\frac{a}{c}} \right\}$

$R_f = [0, +\infty) - \left\{ \sqrt{\frac{1}{1}} \right\}$

الف) $y = \frac{3x+1}{x-2}$ بجانب قائم و ریشه خارج $x=2$
بجانب افقی $y=\frac{a}{c}$
۱۱۷۵

$x=0$
 $y=-\frac{1}{2}$

ب) $y = \frac{ax+b}{cx+d}$ $ad=cb \Rightarrow$ میگرافید
 $y = \frac{-2(1-2x)}{-1-2x} = -2$



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

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

$R_f = \sqrt[3]{(-\infty, -2] \cup [2, +\infty)} \Rightarrow R_f = (-\infty, -\sqrt[3]{2}] \cup [\sqrt[3]{2}, +\infty)$ ۷