

الف) $y = x^2 - \omega$ $x^2 = -y - \omega$ $x = \pm \sqrt{-(y+\omega)}$ 2, 1, 1, 1, 1
 $-(y+\omega)$
 $y + \omega \leq 0$ $y \leq -\omega$
 $R_f = (-\infty, -\omega]$ 4

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

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

ب) $y = x^2 - \omega x + 1$ $y = (x - \frac{\omega}{2})^2 + x + 1$

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

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

الف) $y = \frac{x^2 - 4x + 1}{-x - 1}$ $\xrightarrow{a > 0}$ $\begin{cases} x_{min} = \frac{-b}{2a} = -\frac{-1}{-1} = 1 \\ y_{min} = -1 \end{cases}$ $R_f = [-1, +\infty)$ 5

ب) $y = -x^2 + 4x + 1$ $\xrightarrow{a < 0}$ $\begin{cases} x_{max} = \frac{-b}{2a} = -\frac{4}{-2} = 2 \\ y_{max} = 5 \end{cases}$ $R_f = (-\infty, 5]$

الف) $y = \sqrt{x^2 - 4x + 1}$ $\xrightarrow{x^2 - 4x + 1 \geq 0}$ $\begin{cases} x_{min} = \frac{-b}{2a} = \frac{-(-4)}{2} = 2 \\ y_{min} = -1 \end{cases}$ $R_f = [0, +\infty)$ 6

ب) $y = \sqrt{-x^2 + 4x + 1}$ $\xrightarrow{a < 0}$ $\begin{cases} x_{max} = \frac{-b}{2a} = -\frac{4}{-2} = 2 \\ y_{max} = 1 \end{cases}$ $R_f = [0, \sqrt{5}]$ $(-\infty, 1]$

الف) $y = x^2 + 2x + 1$ $\xrightarrow{\text{نیزترین توان فرد}}$ $R_f = \mathbb{R}$ 7

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

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

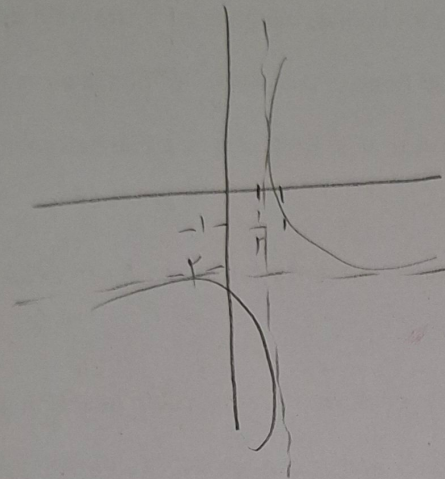
روش می سوم: $\frac{x-1}{1-x}$
 $y = \frac{ax+b}{cx+d}$

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

ریشه کسری = 2

$$y = 3$$

$$y = \frac{4x-2}{1-2x}$$



مجاورت قائمه ریشه کسری: x

مجاورت افقی: $y = \frac{4}{2}$

$$y = -2 \quad \text{ریشه کسری} = \frac{1}{2}$$

$$R_f = [2, +\infty)$$

$$\cos^2 x > 0$$

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$$y = \sqrt{x + \frac{1}{x}}$$

$$(-\infty, -2] \cup [2, +\infty)$$

فروتنی و تنگی
 $x \rightarrow$ $\frac{1}{x}$ $\rightarrow$ $\frac{1}{x}$