

الف) $y = x^2 - 3x + 3 \rightarrow y = x(x^2 - 3x + 3) \rightarrow \frac{y}{x} = (x^2 - 3x + 3)$
 $\Rightarrow \frac{1}{x} = \frac{x^2 - 3x + 3}{y} \Rightarrow x = \frac{y}{x^2 - 3x + 3} \Rightarrow R_f = \mathbb{R}$

ب) $y x^2 - 2y x = 1 \rightarrow x(y x - 2y) = 1 \rightarrow y x - 2y = \frac{1}{x} \rightarrow y x = \frac{1}{x} + 2y$
 $\frac{y x}{1} = \frac{1 + 2xy}{x} = y x^2 = 1 + 2xy \rightarrow x^2 = \frac{1 + 2xy}{y} \Rightarrow R_f = \mathbb{R} - \{0\}$

الف) $y = x^2 - 4x + 10 \rightarrow \frac{-b}{2a} = \frac{4}{2} = 2 \rightarrow 2 \rightarrow [4, +\infty)$

ب) $y = -x^2 + 4x + 3 \Rightarrow \frac{-b}{2a} = \frac{-4}{-2} = 2 \rightarrow 2 \rightarrow (-\infty, 12]$

ج) $y = \sqrt{x^2 - 4x - 3} \rightarrow \frac{-b}{2a} = \frac{4}{2} = 2 \rightarrow -7 \rightarrow \sqrt{[-7, +\infty)} = (0, +\infty)$

د) $y = \sqrt{4x - x^2} \rightarrow \frac{-b}{2a} = \frac{-4}{-2} = 2 \rightarrow 4 \rightarrow \sqrt{(-\infty, 4]} \rightarrow [0, 3]$

الف) $R_f = \mathbb{R}$

ب) $R_f = \mathbb{R}$

ج) $R_f = \mathbb{R}^+$

د) $R_f = \mathbb{R}^+$

الف) $\frac{x+1}{x-2} \rightarrow R_f = \mathbb{R} - \left\{\frac{1}{2}\right\} \rightarrow R_f = \mathbb{R} - \{3\}$

ب) $\frac{x+1}{x+1} \rightarrow R_f = \mathbb{R} - \left\{\frac{1}{2}\right\} \rightarrow R_f = \mathbb{R} - \{2\}$

الف) $\sqrt{\frac{x+6}{x+1}} \rightarrow R_f = \sqrt{\mathbb{R} - \{2\}} \rightarrow \mathbb{R} - \{\sqrt{2}\}$

ب) $\sqrt{\frac{x+1}{x-x}} \rightarrow \frac{x+1}{-x+2} \rightarrow R_f = \mathbb{R} - \{-3\} \rightarrow R_f = \mathbb{R} - \{0\}$

الف) $\frac{2x-3}{x+1}$ جانب قائم = ۲ جانب افقی = -۱	ب) $\frac{2x-1}{x+2}$ جانب قائم = ۲ جانب افقی = -۲
الف) $\sin x + \frac{1}{\sin x} \Rightarrow (-\infty, -2] \cup [2, +\infty)$ ب) $y = \frac{x^4+1}{x^3} = \frac{x^4}{x^3} + \frac{1}{x^3} \Rightarrow x + \frac{1}{x^3} \Rightarrow (-\infty, -2] \cup [2, +\infty)$ ج) $y = \frac{\sqrt[3]{x^2+1}}{\sqrt[3]{x}} = \frac{\sqrt[3]{x^2}}{\sqrt[3]{x}} + \frac{1}{\sqrt[3]{x}} \Rightarrow \sqrt[3]{x} + \frac{1}{\sqrt[3]{x}} \Rightarrow (-\infty, -2] \cup [2, +\infty)$ د) $\sqrt{x} + \frac{1}{\sqrt{x}} \Rightarrow [2, +\infty)$	۷
الف) $y = x^2 + \frac{1}{x^2+3} = y = \frac{x^4 + 3x^2 + 1}{x^2+3} = yx^2 + 3y = x^4 + 3x^2 + 1$ $yx^2 - 3x^2 = x^4 - 3y + 1 \Rightarrow x^2(y-3) = x^4 - 3y + 1 \Rightarrow x^2 = \frac{x^4 - 3y + 1}{y-3}$ ب) $y = \frac{x^2+5}{\sqrt{x^2+4}} \Rightarrow y = \frac{x^4+2x^2+10x^2}{x^2+4} = yx^2 + 4y = x^4 + 2x^2 + 10x^2 \Rightarrow yx^2 - 10x^2 = x^4 + 2x^2 - 4y$ $x^2(y-10) = x^4 + 2x^2 - 4y = x^2 = \frac{x^4 + 2x^2 - 4y}{(y-10)} = R_f = \sqrt{1R - \{10\}} = 1R - \{10\}$	۸
$y = x-3 + 3x+4$ $\begin{cases} x > 3 & x-3+3x+4 \rightarrow 4x+1 \\ \frac{4}{3} < x \leq 3 & -x+3+3x+4 \rightarrow 2x+7 \\ x \leq \frac{4}{3} & -x+3-3x-4 \rightarrow -4x-1 \end{cases}$	۹
الف) $y = x-2 + 2x+2$ $2 - (-1) = 3 \rightarrow R_f = [3, +\infty)$ ب) $2x-2 - x+1$ $\Rightarrow K = 1 - (-1) = (K=2) \rightarrow R_f = [-2, 2]$	در تابع مذکور برد از اختلاف دو ریشه سرد می شود بر توابع آبشار برابر با در ریشه داخلی قدر مطلق است ۱۰