

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

ب) $y = x^2 + 1 \Rightarrow x^2 = y - 1 \Rightarrow$
 $x = \pm \sqrt{y-1} \Rightarrow R_f = [1, +\infty)$

الف) $y = x^2 - 4x + 7 \Rightarrow x^2 - 4x + 4 + 3 = y \Rightarrow$
 $(x-2)^2 + 3 = y \Rightarrow$ اقدام دوم
 $R_f = [3, +\infty)$ از هر چیزی (و...) که بزرگتر
یا برابرش افشانیم

ب) $y = x^2 - 5x + 1 \Rightarrow y + \frac{25}{4} =$
 $x^2 - 5x + 1 + \frac{25}{4} = y + \frac{25}{4} \Rightarrow y = (x - \frac{5}{2})^2 - \frac{21}{4}$
 $R_f = [-\frac{21}{4}, +\infty)$ از هر چیزی بزرگتر یا برابرش افشانیم

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

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

$y = \frac{1}{x^2 - 4x} \Rightarrow y(x^2 - 4x) = 1 \Rightarrow yx^2 - 4yx - 1 = 0 \Rightarrow x = \frac{4y \pm \sqrt{16y^2 + 4y}}{2y}$
 $x = \frac{2 \pm \sqrt{4y^2 + y}}{y} \Rightarrow (4y^2 + y) \geq 0 \Rightarrow y \geq -\frac{1}{4} \Rightarrow y \geq -\frac{1}{4}$
 $R_f = [-\frac{1}{4}, +\infty) - \{0\}$ دائره محصوره در دایره
 $y \neq 0 \Rightarrow y \neq 0 \Rightarrow R_f = [-\frac{1}{4}, +\infty) - \{0\}$

الف) $y = x^2 - 6x + 2 \Rightarrow \begin{cases} \min x = \frac{-b}{2a} = \frac{3}{1} \\ \min y = -\frac{b^2}{4a} = -\frac{9}{1} \end{cases}$
 $\rightarrow y = 9 - 18 + 2 = -7 \Rightarrow$
 $R_f = [-7, +\infty)$

ب) $y = -x^2 + 4x + 2 \Rightarrow \begin{cases} \max x = \frac{-b}{2a} = \frac{2}{-1} \\ \max y = -\frac{b^2}{4a} = -\frac{4}{-1} = 4 \end{cases}$
 $\max y = -4 + 8 + 2 = 6 \Rightarrow$
 $R_f = (-\infty, 6]$

$$1) y = \sqrt{x^2 - 5x + 2} \Rightarrow \begin{cases} \text{max} = \frac{-b}{2a} = \frac{5}{2} \\ \text{min} = \frac{9 - 18 + 2}{2} = -\frac{7}{2} \end{cases}$$

$$\Rightarrow R_f = \sqrt{[-\frac{7}{2} \quad +\infty)}$$

$$2) y = \sqrt{-x^2 + 4x + 1} \Rightarrow \begin{cases} \text{max} = \frac{-b}{2a} = \frac{2}{-1} = -2 \\ \text{min} = \frac{4 - 16 + 1}{-2} = \frac{11}{2} \end{cases}$$

$$\Rightarrow R_f = \sqrt{(-\infty \quad \frac{11}{2})} = \sqrt{[-\infty \quad \frac{11}{2}]} = [-\infty \quad \frac{11}{2}]$$

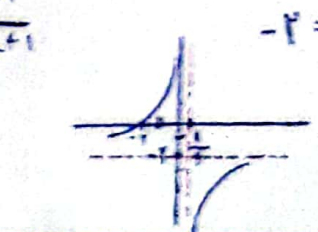
$$3) y = x^2 + 2x + 1 \Rightarrow R_f = [1 \quad +\infty)$$

$$4) y = \sqrt{x^2 + 4x + 1} \Rightarrow R_f = [0 \quad +\infty)$$

$$5) y = \frac{x+1}{x-2} \Rightarrow R_f = \mathbb{R} - \left\{\frac{1}{2}\right\}$$

$$6) y = \sqrt{\frac{x+1}{x-2}} \Rightarrow R_f = [0 \quad +\infty) - \left\{\frac{1}{2}\right\}$$

$$7) y = \frac{x+1}{x-2} \Rightarrow \begin{aligned} &\text{واحد تا یک} \Rightarrow y = x \\ &\text{موازی محور} \Rightarrow y = \frac{1}{2} \\ &\text{از مرکز در ربع اول} \Rightarrow \frac{b}{a} = \frac{1}{2} \end{aligned}$$


$$8) y = \frac{x-1}{1-2x} \Rightarrow \begin{aligned} &\frac{1}{y} = x \\ &-1 = y \\ &-2 = \frac{b}{a} \end{aligned}$$


$$9) y = \cos^2 x + \frac{1}{\cos^2 x} \Rightarrow R_f = [2 \quad +\infty)$$

⊕ متناظر است

$$10) y = \sqrt{\frac{x^2+1}{x}} \Rightarrow y = \sqrt{x + \frac{1}{x}}$$

$$\Rightarrow R_f = (-\infty \quad -1] \cup [1 \quad +\infty)$$