

۱.  $y = n^3 - 3n^2 + 2n$   $\Delta = 9 - 12 = -3 < 0$   $\Rightarrow$  همیشه منفی است  $\Rightarrow$   $R_f = \mathbb{R}$

۲.  $y = \frac{1}{n^2 - 2n}$   $\Delta = b^2 - 4ac = 4 - 4 = 0$   $\Rightarrow$   $R_f = (-\infty, -1] \cup (0, +\infty)$

۳.  $y = \frac{-b}{2a} = \frac{-(-4)}{2} = 2$   $a = 1$   $1 > 0$   $\Rightarrow$   $R_f = [2, +\infty)$

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۵.  $y = \frac{-b}{2a} = \frac{-(-4)}{2} = 2$   $a = -1$   $-1 < 0$   $\Rightarrow$   $R_f = (-\infty, 2]$

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۱۰.  $y = \frac{-b}{2a} = \frac{-(-4)}{2} = 2$   $a = 1$   $1 > 0$   $\Rightarrow$   $R_f = \mathbb{R}^2 = [0, +\infty)$

۱۱.  $y = \frac{2n+1}{n-2}$   $ad \neq bc$   $2 \times 1 \neq 1 \times 2$   $\Rightarrow$   $R_f = \mathbb{R} - \{2\}$

۱۲.  $y = \frac{2n+1}{n+1}$   $ad \neq bc$   $2 \times 1 \neq 1 \times 1$   $\Rightarrow$   $R_f = \mathbb{R} - \{2\} = \mathbb{R} - \{2\}$

۱۳.  $y = \sqrt{\frac{2n+1}{n+1}}$   $ad \neq bc$   $2 \times 1 \neq 1 \times (-1)$   $\Rightarrow$   $R_f = \sqrt{\mathbb{R} - \{2\}} = [0, +\infty) - \{2\}$

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$$\text{مثال } y = \frac{x-1}{x+1} \quad \text{بالتقسيم: } \frac{a}{c} = y = \frac{x}{1}$$

$$\text{بقسمة: } \frac{x-1}{x+1} = a = -1$$

$$x+1=0 \Rightarrow x=-1$$

$$x=0 \Rightarrow \frac{1(0)-1}{0+1} = -1$$

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$$\text{مثال } y = \sin x + \frac{1}{\sin x}$$

$$R_f: (-\infty, -1] \cup [1, +\infty)$$

$$\text{مثال } y = \sqrt{x^2+1} = \frac{x^2+1}{\sqrt{x^2+1}} = \frac{x^2}{\sqrt{x^2+1}} + \frac{1}{\sqrt{x^2+1}} = \sqrt{x^2+1} + \frac{1}{\sqrt{x^2+1}}$$

$$R_f: (-\infty, 1] \cup [1, +\infty)$$

$$\text{مثال } y = \frac{x^4+1}{x^2} = \frac{x^4}{x^2} + \frac{1}{x^2} = x^2 + \frac{1}{x^2}$$

$$R_f: (-\infty, -1] \cup [1, +\infty)$$

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

$$R_f: (-\infty, -1] \cup [1, +\infty)$$

$$\text{مثال } y = \frac{x^2+1}{x^2+1} = \frac{x^2+1}{a} + \frac{1}{\frac{1}{a}} = a + \frac{1}{a} - 1$$

$$R_f: \left[\frac{1}{\sqrt{2}}, +\infty\right)$$

$$\text{مثال } y = \frac{x^2+1}{\sqrt{x^2+1}} = \frac{x^2+1}{\sqrt{x^2+1}} + \frac{1}{\sqrt{x^2+1}} = \sqrt{x^2+1} + \frac{1}{\sqrt{x^2+1}}$$

$$R_f: \left[\frac{2}{\sqrt{2}}, +\infty\right)$$

$$y = |x-1| + |x+1|$$

$$\begin{cases} x < -1 \\ -1 < x < 1 \\ x > 1 \end{cases}$$

$$\begin{cases} -x+1-1-x-1 = -2x-2 \\ -x+1+1-x+1 = -2x+2 \\ x-1+1+x+1 = 2x+1 \end{cases}$$

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$$\text{مثال } y = |x-1| + |x+1|$$

$$\begin{cases} x-1=0 \Rightarrow x=1 \\ x+1=0 \Rightarrow x=-1 \end{cases} \quad |1-(-1)| = 2$$

$$R_f: [1, +\infty)$$

$$\text{مثال } y = |x-1| - |x+1|$$

$$\begin{cases} x-1=0 \Rightarrow x=1 \\ x+1=0 \Rightarrow x=-1 \end{cases} \quad |1-(-1)| = 2$$

$$R_f: [-1, 1]$$