

$$y = \frac{x^2 + x + 1}{x - 1} \rightarrow yx - y = x^2 + x + 1 \quad x^2 + (1-y)x + (1+y) = 0 \quad x = \frac{y-1 \pm \sqrt{(1-y)^2 - 4(1+y)}}{2} \quad (1)$$

$$1 + y^2 - 2y - 1 - 4y \geq 0 \rightarrow y^2 - 6y - 4 \geq 0 \quad (y-7)(y+1) \geq 0 \quad \frac{-1}{+1} - \frac{7}{+1}$$

$$R_f = (-\infty, -1] \cup [7, +\infty)$$

آزمین شری

$$(1) \quad -\frac{b}{a} = \frac{0}{1} \quad 2\left(\frac{25}{14}\right) - 0\left(\frac{0}{1}\right) + 1 = \frac{-17}{14} \quad R_f = \left[-\frac{17}{14}, +\infty\right)$$

$$(2) \quad -\frac{b}{a} = \frac{-6}{-2} = 3 \quad -9 + 18 - 8 = 1 \rightarrow \sqrt{[-\infty, 1]} \rightarrow R_f = [0, 1]$$

$$(3) \quad \text{بزرگترین مقدار} = \infty \Rightarrow \sqrt{R} \rightarrow R_f = [0, +\infty)$$

$$(4) \quad R_f = R = (-\infty, +\infty)$$

$$(1) \quad \frac{3x+1}{x-2} = y \rightarrow R_f = R - \{2\} = R - \left\{\frac{1}{3}\right\}$$

$$(2) \quad y = \sqrt{\frac{4x+1}{x-2}} \rightarrow \sqrt{R - \{2\}} \Rightarrow [0, +\infty) - \{1\}$$

$$(3) \quad y = \frac{x^2 + 3 + 1}{\sqrt{x^2 + 3}} \rightarrow y = \sqrt{x^2 + 3} + \frac{1}{\sqrt{x^2 + 3}} \quad \sqrt{3} + \frac{1}{\sqrt{3}} = \frac{4\sqrt{3}}{3} \quad R_f = \left[\frac{4\sqrt{3}}{3}, +\infty\right)$$

$$(4) \quad y = x^2 + 2 + \frac{1}{x^2 + 2} - 2 \rightarrow 2 + \frac{1}{2} - 2 = \frac{1}{2} \rightarrow R_f = \left[\frac{1}{2}, +\infty\right)$$

$$(1) \quad yx^2 - y = 3x^2 + 4 \quad 3x^2 - yx^2 = -4 - y \rightarrow x^2(3-y) = \frac{-4-y}{3-y}$$

$$x^2 = \frac{4+y}{y-3} \quad x = \pm \sqrt{\frac{4+y}{y-3}} \quad \frac{-4}{+1} - \frac{3}{+1} \quad R_f = (-\infty, -4] \cup (3, +\infty)$$

$$(2) \quad x^2 \begin{cases} \text{کوچکترین مقدار} = 0 \rightarrow -4 \\ \text{بزرگترین مقدار} = +\infty \rightarrow 3 \end{cases} \Rightarrow \text{خارج شدن} \Rightarrow \text{مخرج می تواند صفر شود}$$

$$R_f = (-\infty, -4] \cup (3, +\infty)$$

$$(1) \quad y \sin x + 3y = 2 \sin x - 1 \quad 3y + 1 = 2 \sin x - y \sin x \quad \sin x = \frac{3y+1}{2-y}$$

$$-1 \leq \frac{3y+1}{2-y} \leq 1 \rightarrow -\frac{3}{4} \leq y \leq \frac{1}{4}$$

$$(2) \quad \sin x \begin{cases} \text{کوچکترین مقدار} = -1 \rightarrow \frac{-3}{4} \\ \text{بزرگترین مقدار} = +1 \rightarrow \frac{1}{4} \end{cases}$$

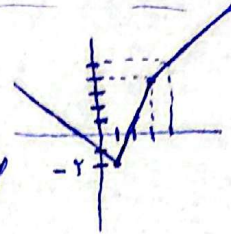
$$R_f = \left[-\frac{3}{4}, \frac{1}{4}\right]$$

$$x^2 - x + 1 = 0 \rightarrow \Delta < 0 \rightarrow \text{لا يوجد جذور حقيقية} \Rightarrow R_f = \mathbb{R}$$

$$\text{القيمة الدنيا} = \frac{\frac{1}{4}}{\frac{1}{1}} = \frac{1}{4}$$

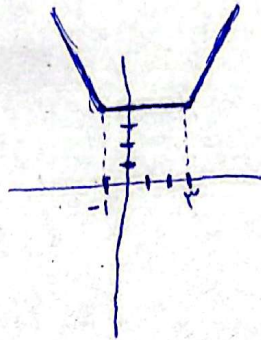
$$x^2 - x + \frac{1}{4} < x^2 - x + 1 \Rightarrow R_f = [\frac{1}{4}, 1)$$

$$\text{الف) } \frac{1}{-2x+2+x-2} \frac{2}{2x-2+x-2} \frac{3}{2x-2-x+3}$$



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

$$\text{ب) } y = |x-2| + |x+1|$$



$$R_f = [3, +\infty)$$

$$|x-2| - |2x+2| \leq 1$$

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

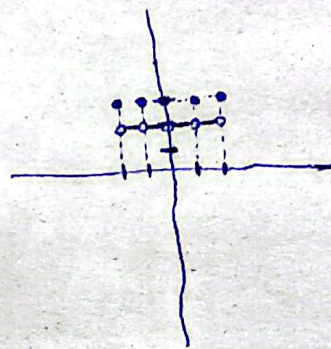
$$x+2 \leq 1 \quad -2x \leq 1 \quad -x-2 \leq 1$$

$$x \leq -1 \quad x \geq -\frac{1}{2} \quad x \geq -3 \rightarrow x \geq -1$$

$$\rightarrow -\frac{1}{2} \leq x \leq 2$$

$$(-\infty, -1] \cup [-\frac{1}{2}, +\infty)$$

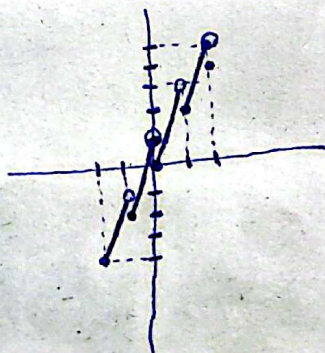
$$\text{الف) } y = [x] + [-x] + 2$$



$$R_f = \{2\}$$

$$\text{ب) } y = 2x - [x]$$

$$\begin{cases} -1 \leq x < 0 \rightarrow 2x+2 \\ 0 \leq x < 1 \rightarrow 2x \\ 1 \leq x < 2 \rightarrow 2x-1 \end{cases}$$



$$R_f = [-1, 1)$$

$$\text{الف) } \sin x = -\frac{1}{2} \rightarrow \frac{1}{2} - \frac{1}{2} + 1 = \frac{3}{2} \quad \sin x = 1 \rightarrow y = 1$$

$$\sin x = -1 \rightarrow y = 3 \quad R_f = [\frac{3}{2}, 3]$$

$$\text{ب) } \sin^2 x = -\frac{1}{2} \rightarrow -\frac{1}{2}x \quad \sin^2 x = 1 \rightarrow y = 3 \quad \sin^2 x = 0 \rightarrow y = 1$$

$$R_f = [1, 3]$$