

الف: $y|x| - 2y = |x| + 1$

$$y|x| - |x| = 2y + 1$$

$$|x|(y-1) = 2y+1$$

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

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

$$R_f = \mathbb{R} - \{1\}$$

$$\therefore \frac{x^2+1}{|x|} = |x| + \frac{1}{|x|}$$

$$|x| = +$$

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

$$yx + 3y = x^2 + 2x - 2$$

$$x^2 + x(2-y) - 2 - 3y = 0$$

$$\Delta \geq 0$$

$$(2-y)^2 - 4(-2-3y) \geq 0$$

$$y^2 + 4 - 4y + 8 + 12y \geq 0$$

$$y^2 + 8y + 12 \geq 0$$

$$(y+2)(y+6) \geq 0$$

$$\frac{-6}{+} \quad \frac{-2}{-}$$

$$R_f = \mathbb{R} - (-6, -2)$$

$$x^2 - x + 1 \neq 0$$

$$\Delta < 0$$

این از آن دسته معادله ها است که

$$\left. \begin{array}{l} x^2 - x + 1 \neq 0 \\ \Delta < 0 \end{array} \right\} R_f = \mathbb{R}$$

$$x = \frac{1-y \pm \sqrt{\Delta}}{2-2y}$$

$$\Delta \geq 0$$

$$\begin{array}{l} 2-2y \neq 0 \\ y \neq 1 \\ y \neq 1 \end{array}$$

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

$$x^2(1-y) + x(y-1) + \frac{1}{x} - y = 0$$

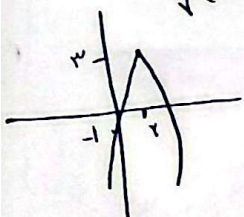
$$y^2 + 1 - 2y + 4y - 4y^2 - 1 + y = -3y^2 + 3y \geq 0$$

$$3y(1-y) \geq 0$$

$$\frac{0}{-} \quad \frac{1}{+}$$

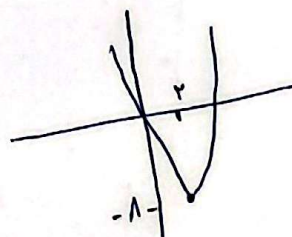
$$R_f = [0, 1)$$

الف: $\sqrt{(-\infty, 3]} = [0, \sqrt{3}]$



$$R_f = [0, \sqrt{3}]$$

الف:



$$R_f = [-1, +\infty)$$

الف: $x^3 - x + 1 \rightarrow \mathbb{R}$

$$\left. \begin{array}{l} x^3 - x + 1 \\ \text{بر مبنای ۱۰} \end{array} \right\} \mathbb{R}$$

$$R_f = \mathbb{R}$$

$$\therefore y = \frac{x^2+1}{x}$$

$$x^2 + 1 = yx$$

$$x^2 - yx + 1 = 0$$

$$x = \frac{y \pm \sqrt{\Delta}}{1}$$

$$\Delta \geq 0$$

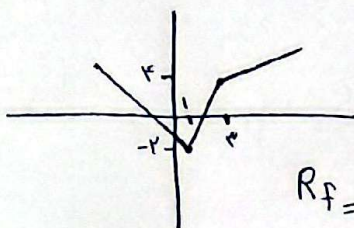
$$y^2 - 4 \geq 0$$

$$y^2 \geq 4$$

$$\frac{-}{-} \quad \frac{+}{+}$$

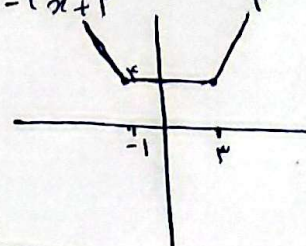
$$R_f = [1, +\infty)$$

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



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

ب: $\frac{1}{x-1} + \frac{1}{x-2} + \frac{1}{x-3}$

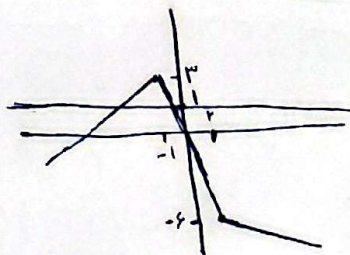


$R_f = [2, +\infty)$

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

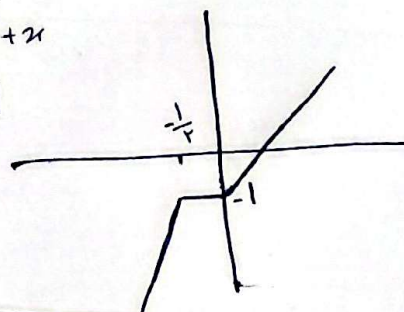
$\frac{1}{x+1} = 1$
 $x = -\frac{1}{1}$
 $x = -1$

$\frac{1}{x-1} = 1$
 $x = 1$
 $x = 1$



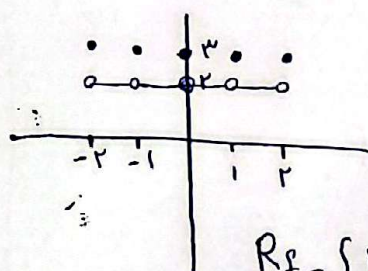
الف: $R_f = (-3, -\frac{1}{2})$

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



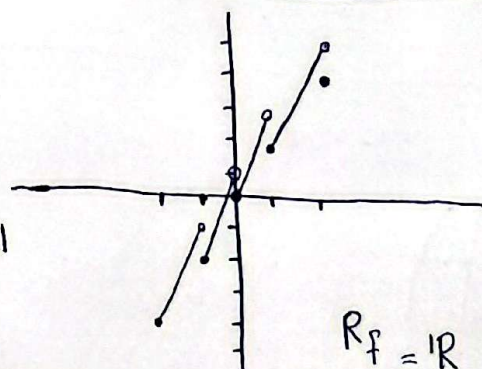
$R_f = R$

الف: $[x] + [-x] + 1$



$R_f = \{1, 3\}$

ب: $[-2, -1) \rightarrow \frac{1}{x+1}$
 $[-1, 0) \rightarrow \frac{1}{x+1}$
 $[0, 1) \rightarrow \frac{1}{x}$
 $[1, 2) \rightarrow \frac{1}{x-1}$
 $\{2\} \rightarrow 1$



$R_f = R$

$\sin x \rightarrow 1 \rightarrow 1 - 1 + 1 = 1$
 $\sin x \rightarrow -1 \rightarrow 1 + 1 + 1 = 3$
 $\sin x \rightarrow \frac{1}{x} \rightarrow \frac{1}{x} - \frac{1}{x} + 1 = \frac{1}{x}$

$R_f = [\frac{1}{x}, 3]$

$\sin^2 x \rightarrow 0 \rightarrow 0 + 0 + 1 = 1$
 $\sin^2 x \rightarrow 1 \rightarrow 1 + 1 + 1 = 3$
 $\sin^2 x \rightarrow \frac{1}{x} \rightarrow \frac{1}{x} - \frac{1}{x} + 1 = 1$

$R_f = [1, 3]$