

الف) $y = x^m - m x^{m-1} + m x^{m-2} - \dots + (-1)^{m-1} x + (-1)^m$
 $(x-1)^m : y-1 = (m-1)x \rightarrow x = \sqrt[m]{y-1} + 1 ; R_f = \mathbb{R}$

$$\Rightarrow y = \frac{1}{n^r - n} : n^r y - n y = 1 \rightarrow (y) n^r + (-y) n - 1 = 0$$

$$\Delta = 1 + 4y \geq 0 \rightarrow y(y+1) \geq 0$$

$$\frac{-1 \pm \sqrt{1+4y}}{2} : R_f = (-\infty, -1] \cup (0, +\infty)$$

الف) $y = x^2 - 6x + 1$: $\begin{cases} x = \frac{-b}{2a} : \frac{6}{2} = 3 \\ \text{Min} = 1 - 9 + 1 = -7 \end{cases} : R_f = \underline{\underline{[4, +\infty)}}$

ب) $y = -x^2 + 4x + 3$: $\begin{cases} x = \frac{-b}{2a} : \frac{4}{-2} = -2 \\ \text{Max} = -(-2)^2 + 4(-2) + 3 = -7 \end{cases} : R_f = \underline{\underline{(-\infty, 11]}}$

$\Delta) y = \sqrt{x^2 - 3} \rightarrow \begin{cases} x - 1 - 3 = -v \\ x - 1 - 3 = -v \end{cases} \rightarrow R_f = [-v, +\infty) \xrightarrow{\sqrt{\cdot}} [0, +\infty)$

الف) $y = x^3 - 2x^2 + 2x + 1$: $R_f = \mathbb{R}$


$$\Rightarrow y = x^4 - 4x^3 + 3x^2 + x \quad : R_f = 1R$$

$$z^2 y = \sqrt{\underbrace{z^2 - z^2 + a_{n+1}}_{R}} \rightarrow R_f = [0, \infty)$$

$$1) y = \underbrace{(x^2 - 2x^2 + x_1 + 1)}_{\mathbb{R}} \rightarrow \mathbb{R}_f = [0, \infty)$$

الف) $y = \frac{x+1}{x-2}$: $R_f = \mathbb{R} - \{2\}$

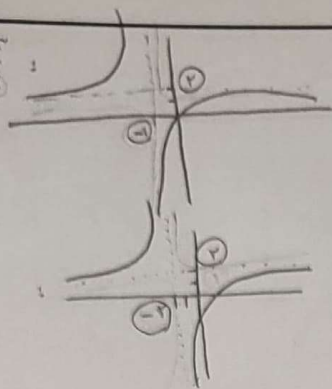
$\therefore y = \frac{r n + 1}{n + 1}$

الف) $y = \sqrt{\frac{x+1}{x+1}}$:  : $R_f = R - \{r\} \Rightarrow [0, +\infty) - \{F\}$

$$\therefore y = \sqrt{\frac{x+1}{x-1}} \quad : R_f = \mathbb{R} - \{-1\} \Rightarrow [0, +\infty)$$

الف) $y = \frac{x-3}{x+1}$:

١- جانب مجزوع
٢- جانب افقي

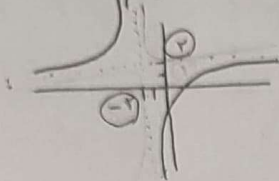


$R_f = \mathbb{R} - \{-1\}$

٢- جانب افقي

ب- $y = \frac{x-1}{x+2}$:

١- جانب مجزوع
٢- جانب افقي



$R_f = \mathbb{R} - \{-2\}$

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الف) $y = \sin x + \frac{1}{\sin x}$: $R_f = (-\infty, -2] \cup [2, +\infty)$

ب- $y = \frac{x^2+1}{x^3}$: $R_f = (-\infty, -2] \cup [2, +\infty)$

ج- $y = \frac{\sqrt{x^2+1}}{\sqrt{x}}$: $R_f = (-\infty, -2] \cup [2, +\infty)$

د- $y = \sqrt{x} + \frac{1}{\sqrt{x}}$: $R_f = [2, +\infty)$

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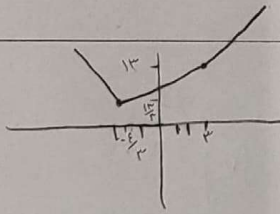
الف) $y = x^2 + \frac{1}{x^2+3}$: $\rightarrow x^2 \rightarrow \min = 0$: $0 + \frac{1}{0+3} = \frac{1}{3}$: $R_f = [\frac{1}{3}, +\infty)$

ب- $y = \frac{x^2+5}{\sqrt{x^2+4}}$: $\rightarrow \min x^2 = 0$: $\frac{0+5}{\sqrt{0+4}} = \frac{5}{2}$: $R_f = [\frac{5}{2}, +\infty)$

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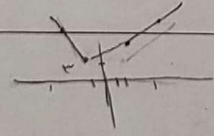
$y = |x-3| + |2x+1|$:

١- $x-3 \geq 0$: $x \geq 3$: $y = x-3 + 2x+1 = 3x-2$
٢- $x-3 < 0$: $x < 3$: $y = -(x-3) + 2x+1 = x+4$
٣- $2x+1 \geq 0$: $x \geq -\frac{1}{2}$: $y = |x-3| + 2x+1$
٤- $2x+1 < 0$: $x < -\frac{1}{2}$: $y = |x-3| - 2x-1$



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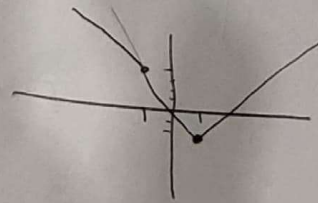
الف) $y = |x-2| + |2x+1|$:



$R_f = [3, +\infty)$

ب- $y = |2x-2| - |x+1|$:

١- $2x-2 \geq 0$: $x \geq 1$: $y = 2x-2 - (x+1) = x-3$
٢- $2x-2 < 0$: $x < 1$: $y = -(2x-2) - (x+1) = -3x+1$
٣- $x+1 \geq 0$: $x \geq -1$: $y = |2x-2| - x-1$
٤- $x+1 < 0$: $x < -1$: $y = |2x-2| + x+1$



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

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