

(1)

$$\text{الف) } y = \frac{|x|+1}{|x|-2} \rightarrow y(|x|-2) = |x|+1$$

$$\rightarrow y|x| - |x| = 1+2y \rightarrow |x| = \frac{1+2y}{y-1} \rightarrow |x| \geq 0$$

$$\rightarrow \frac{-\frac{1}{2}}{+\phi - \frac{1}{2}+} \rightarrow R_y = (-\infty, -\frac{1}{2}] \cup (1, +\infty)$$

$$\text{ب) } y = \frac{x^2+1}{|x|} \rightarrow = \frac{x^2}{|x|} + \frac{1}{|x|} = |x| + \frac{1}{|x|} \rightarrow R_y = [2, +\infty)$$

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

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

$$\rightarrow y^2+4y+12 \geq 0 \rightarrow (y+4)(y+2) \geq 0$$

$$R_y = [-\infty, -4] \cup [-2, +\infty)$$

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

$$\Delta = 1-f = -\frac{1}{x} \rightarrow R_f = \mathbb{R}$$

(3)

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

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

$$\rightarrow y^2+y \geq 0 \rightarrow R_f = [0, 1)$$

$$\text{الف) } y = \sqrt{-x^2+4x-1} \rightarrow \begin{cases} \min = 0 \\ \max = \sqrt{\frac{\Delta}{a}} = \sqrt{\frac{16-4}{1}} = \sqrt{12} \end{cases} \quad (4)$$

$$R_y = [0, \sqrt{12}]$$

$$\text{ب) } y = \sqrt[3]{x^2-4x} \rightarrow \begin{cases} \max = +\infty \\ \min = \sqrt[3]{-\frac{\Delta}{4a}} = \sqrt[3]{-\frac{4}{1}} = -2 \end{cases}$$

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

الف) $y = \log(n^2 - n + 1)$

(5)

برد چند جمله ای با توان بزرگ مزد ۱۲ است پس در بردار: $(0 + \infty)$ می خواهیم و اگر این در دامنه $\log$ باشد برد برابر $\mathbb{R}$ می شود.

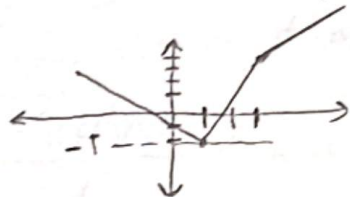
ب) $y = \log_r\left(\frac{n^2+1}{n}\right) = \log_r\left(n + \frac{1}{n}\right)$

$\downarrow$
بالا تر صفر $\rightarrow [2 + \infty)$

$\rightarrow \mathbb{R}_y = [1 + \infty)$

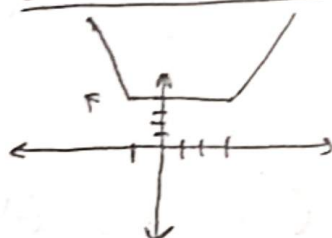
الف)

$y = |n-2| - |n-3|$



$-n-1 \quad | \quad 3n-5 \quad | \quad n+1$

$\mathbb{R}_y = [-2, +\infty)$



ب) $y = |n-3| + |n+1|$

$\mathbb{R}_y = [4, +\infty)$

$y = |n-2| - |2n+2| \leq 1 \rightarrow |n-2| - |2n+2| - 1 \leq 0$

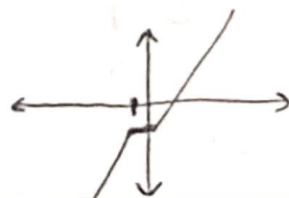
(v)

$\begin{array}{ccc} -1 & & 2 \\ n+3 & | & -2n-1 & | & -n-5 \\ \downarrow & & \downarrow & & \downarrow \\ n \leq -3 & & n \geq -\frac{1}{2} & & n \geq -5 \\ \downarrow & & \downarrow & & \downarrow \\ (-\infty, -3] & & [-\frac{1}{2}, +2] & & [2, +\infty) \end{array}$

$\rightarrow \mathbb{R}_y = (-\infty, -2] \cup [-\frac{1}{2}, +\infty)$

$y = 3n - |2n+1| + |n|$

$\begin{array}{ccc} -\frac{1}{2} & & 0 \\ 2n+1 & | & -1 & | & 2n-1 \end{array}$

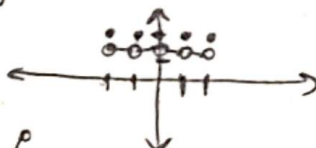


$\mathbb{R}_y = \mathbb{R}$

(^)

الف) $y = [n] + [3-n] = [n] + [-n] + 3$

$\mathbb{R}_y = \{1, 2\}$



(9)

ب) $y = 3n - [n]$



$\mathbb{R}_y = [-1, 5)$

الف) $y = \sin^2 n - \sin n + 1$

$$\begin{cases} D_{\max} = 1 \\ D_{\min} = \frac{1}{4} \\ D = -\frac{b}{4a} \rightarrow \frac{1}{4} \end{cases}$$

(10)

$$R_y = \left[\frac{1}{4}, 1 \right]$$

ب) $y = \sin^2 n + \sin n + 1$

$$\begin{cases} D_{\max} = \frac{5}{4} \\ D_{\min} = 1 \\ D = -\frac{b}{4a} \rightarrow D = -\frac{1}{4} \times \rightarrow D \geq 0 \end{cases}$$

$$\rightarrow R_y = [1, \frac{5}{4}]$$