

تکلیف شماره ۵ - فضا محسوس

الف) $y = \frac{|x|+1}{|x|-2}$ $|x| \rightarrow +\infty \rightarrow 1 \rightarrow \text{باز}$ (۲) (۱)

$\downarrow$
خرج متوالی صفر شود

$0 \rightarrow -\frac{1}{2} \rightarrow \text{بسته}$

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

ب) $y = \frac{x^2+1}{|x|} = |x| + \frac{1}{|x|}$ $a + \frac{1}{a} \quad a > 0$ $[2, +\infty)$

$y = \frac{x^2+2x-2}{x+\mu} \rightarrow yx + \mu y = x^2 + 2x - 2$ (۲) (۲)

$x^2 + (2-y)x - \mu y - 2 = 0$

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

$\Delta \geq 0 \quad y^2 + 4y + 12 \geq 0$

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

$-2 \quad -6$

$\begin{array}{c|c|c|c} & -6 & -2 & \\ \hline & + & - & + \end{array}$ $(-\infty, -6] \cup [-2, +\infty)$

$y = \frac{x^2-x+\frac{1}{x}}{x^2-x+1}$ $df = ? \rightarrow df = R$ (۳) (۲)

$\downarrow x^2-x+1 \rightarrow \Delta = 1-4 = -3 \quad \Delta < 0$

$yx^2 - yx + y = x^2 - x + \frac{1}{x}$ $RF = [0, 1)$

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

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

$2(y-1) \rightarrow y \neq 1$

$\Delta = y^2 + 1 - 2y - 4(y-1)(y-\frac{1}{x}) = -4y^2 + 4y = 4y(1-y) \geq 0$

ب) $\sqrt[3]{x^3 - 12x}$ $\rightarrow$ $xs = -\frac{b}{3a} = -\frac{12}{3} = -4$ (1) (4)

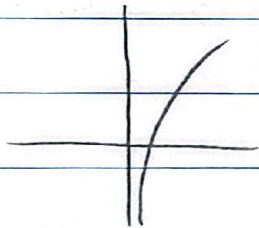
$ys = y_{min} = 1 - 12 = -11$

$\sqrt[3]{[-11, +\infty)} = [-4, +\infty)$

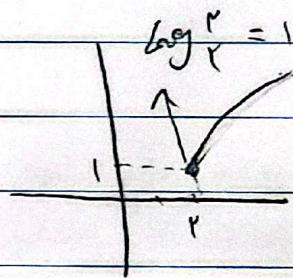
الف) $y = \sqrt{-x^2 + 4x - 1}$ $\rightarrow$ $xs = -\frac{b}{2a} = -\frac{4}{-2} = 2$

$ys = -4 + 1 - 1 = -4$ $\sqrt{(-\infty, 4]} = \sqrt{[0, 4]}$

الف) $y = \log(x^2 - x + 1)$ $\rightarrow$ $R_f = \mathbb{R}$ (2) (5)



ب) $y = \log_p\left(x + \frac{1}{x}\right)$ $\rightarrow$ $(-\infty, -2] \cup [2, \infty)$ $\rightarrow$ $\mathbb{R}$

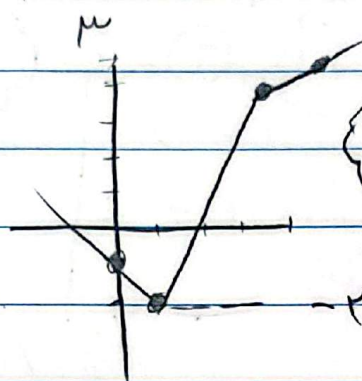


$R_f = [1, +\infty)$

$$i) y = |x - 1| - |x - 2|$$

(r) (y)

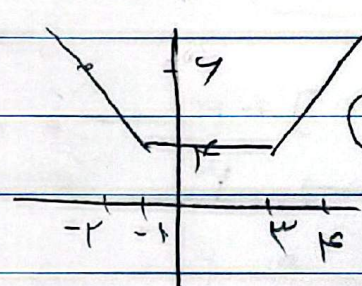
x	y
0	-1
1	-1
2	1
3	0



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

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

x	y
-2	4
-1	2
2	2
3	4



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

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

(r) (v)

$$① x < -1 \rightarrow 1 - x - (-x - 2) \leq 1 \quad x + 1 \leq 1 \quad x \leq 0$$

$$\xrightarrow{n} x \leq 0$$

$$② -1 < x < 2 \rightarrow 1 - x - (x + 2) = -2x \leq 1 \quad x \geq -\frac{1}{2}$$

$$\xrightarrow{n} -\frac{1}{2} \leq x < 2$$

$$③ x > 2 \rightarrow x - 1 - (x + 2) = -3 \leq 1 \quad x \geq 0$$

$$\xrightarrow{n} x > 2$$

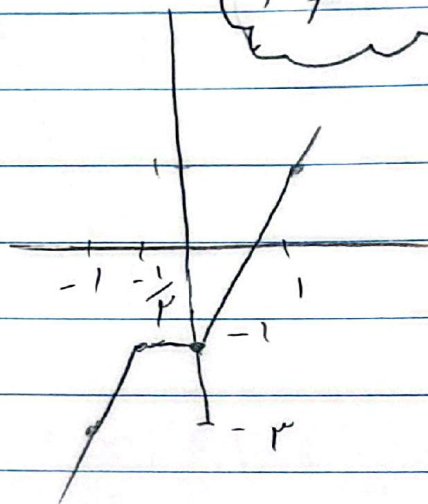
$$\cup$$

$$① \cup ② \cup ③ \quad (-\infty, 0] \cup [-\frac{1}{2}, +\infty)$$

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$$y = \frac{1}{r}x - \left| \frac{x}{r} + 1 \right| + |x|$$

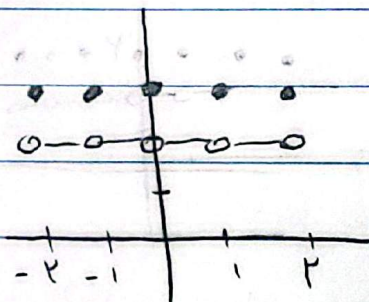
$$\begin{array}{lcl} x & \rightarrow & y \\ -1 & \rightarrow & -\frac{1}{r} \\ -\frac{1}{r} & \rightarrow & -1 \\ 0 & \rightarrow & -1 \\ 1 & \rightarrow & 1 \end{array}$$



$$Rf = \mathbb{R} \checkmark$$

(r) (1)

$$\begin{array}{l} \text{ا) } [x] + [-x] + \frac{1}{r} \\ \left\{ \begin{array}{l} x \in \mathbb{Z} \rightarrow \frac{1}{r} \\ x \notin \mathbb{Z} \rightarrow \frac{1}{r} \end{array} \right. \end{array}$$



(r) (9)

$$Rf = \left\{ \frac{1}{r}, \frac{1}{r} \right\} \checkmark$$

$$\text{ب) } \frac{1}{r}x - [x]$$

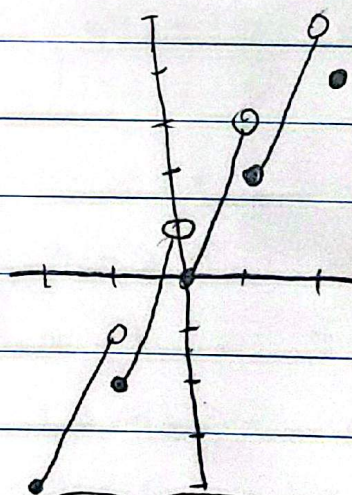
$$[-r, -1) \rightarrow \frac{1}{r}x + r$$

$$[-1, 0) \rightarrow \frac{1}{r}x + 1$$

$$[0, 1) \rightarrow \frac{1}{r}x$$

$$[1, 2) \rightarrow \frac{1}{r}x - 1$$

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



$$Rf = [-r, \infty) \checkmark$$

$$\text{الف) } \sin^2 x - \sin x + 1$$

$$\sin x \begin{cases} -1 \rightarrow 1 + 1 + 1 = \textcircled{3} \\ 1 \rightarrow 1 - 1 + 1 = 1 \\ \frac{1}{x} \rightarrow \frac{1}{x} - \frac{1}{x} + 1 = \textcircled{\frac{1}{x}} \end{cases}$$

(2) (1)

[$\frac{3}{x}$, x]

$$\text{ب) } \sin^2 x + \sin^2 x + 1$$

$$\sin^2 x \begin{cases} 0 \rightarrow \textcircled{1} \\ 1 \rightarrow \textcircled{2} \\ -\frac{1}{x} \rightarrow \textcircled{\frac{1}{x}} \end{cases}$$

[1 , $\frac{1}{x}$]