

تکلیف شماره ۵ - فضا محسوس

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

$\downarrow$   
خرج متوالی صفر شود

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

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

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

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

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

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

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

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

$-2 \quad -6$

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

$y = \frac{x^2-x+\frac{1}{x}}{x^2-x+1}$   $df = ? \rightarrow df = R$  ③

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

$yx^2 - yx + y = x^2 - x + \frac{1}{x}$   $RF = [0, 91)$

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

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

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

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

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

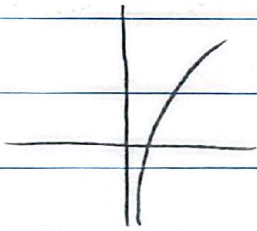
$y_s = y_{\min} = 1 - 12 = -11$

$\sqrt[3]{[-11, +\infty)} = [-\frac{1}{3}, +\infty)$

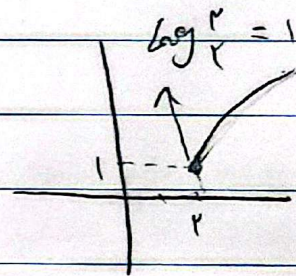
الف)  $y = \sqrt{-x^2 + 4x - 1}$   $\rightarrow$   $x_s = -\frac{b}{2a} = -\frac{4}{-2} = 2$

$y_s = -4 + 4 - 1 = -1$   $\sqrt[2]{(-\infty, 2]} = \sqrt{[0, 5]}$

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



ب)  $y = \log_p\left(x + \frac{1}{x}\right)$   
 $(-\infty, -1] \cup [1, \infty)$   
 غوّق ✓

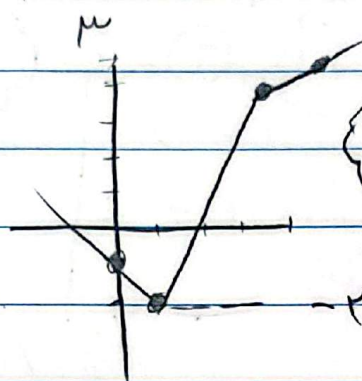


$R_f = [1, +\infty)$

$$4) y = |x - 1| - |x - 2|$$

(4)

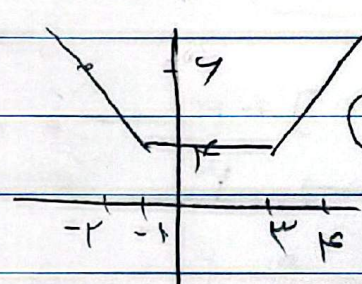
| x | y  |
|---|----|
| 0 | -1 |
| 1 | -1 |
| 2 | 1  |
| 3 | 2  |



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

$$5) y = |x - 1| + |x + 1|$$

| x  | y |
|----|---|
| -2 | 4 |
| -1 | 2 |
| 1  | 2 |
| 2  | 4 |



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

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

(✓)

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

$$\xrightarrow{n} x \leq -1$$

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

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

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

$$\xrightarrow{n} x > 1$$

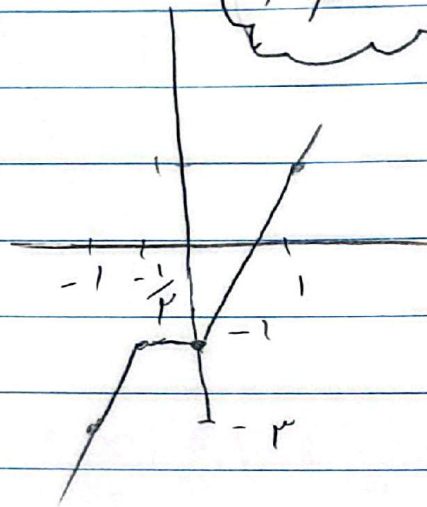
$$\cup \quad (-\infty, -1] \cup [-\frac{1}{2}, +\infty)$$

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

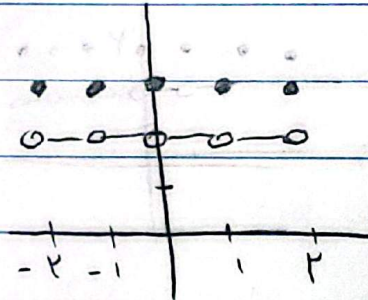
(1)

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



$$Rf = \mathbb{R}$$

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



(2)

$$Rf = \{r, r\}$$

$$\text{ب) } rx - [x]$$

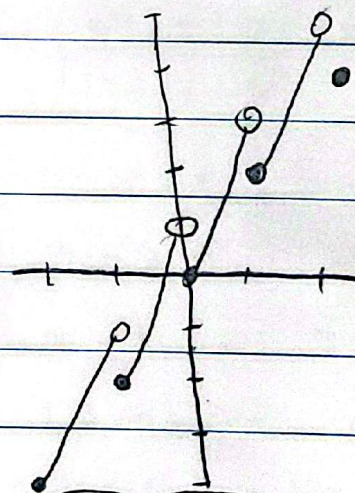
$$[-r, -1) \rightarrow rx + r$$

$$[-1, 0) \rightarrow rx + 1$$

$$[0, 1) \rightarrow rx$$

$$[1, 2) \rightarrow rx - 1$$

$$\{2\} \rightarrow rx - r$$



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

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

(10)

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

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

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

$$\sin^2 x \begin{cases} 0 \rightarrow \textcircled{1} \\ 1 \rightarrow \textcircled{3} \\ -\frac{1}{x} \rightarrow \textcircled{\frac{1}{x}} \end{cases}$$

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