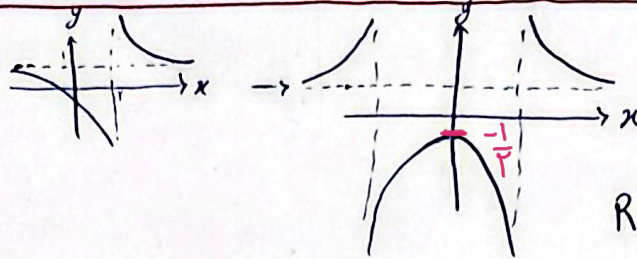


الف) $y = \frac{|x|+1}{|x|-2} \rightarrow \frac{x+1}{x-2}$



$R_f = (-\infty, -\frac{1}{3}] \cup (1, +\infty)$

دقت!

ب) $y = \frac{x^2+1}{|x|} = |x| + \frac{1}{|x|} \Rightarrow R_f = [2, +\infty)$ ✓

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

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

۲-۲

$x = \frac{y-2 \pm \sqrt{(y-2)^2 - 4(-2-y)}}{2} = \frac{y-2 \pm \sqrt{y^2+12y+12}}{2}$

$\Delta \geq 0$

$\Rightarrow y^2+12y+12 \geq 0 \Rightarrow (y+2)(y+6) \geq 0$

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

$R_y = (-\infty, -6] \cup [-2, +\infty)$

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

$\rightarrow \Delta < 0 \Rightarrow$ (مستقر) $D_f = \mathbb{R}$ ✓

۲-۳

$f(x) = 1 - \frac{\frac{3}{x}}{x^2-x+1} = 1 - \frac{3}{x(x^2-x+1)}$

$\begin{matrix} x \rightarrow +\infty & 1 - \frac{3}{+\infty} = 1 \\ x \rightarrow \frac{1}{x^2-x+1} & 1 - \frac{3}{(\frac{1}{x^2-x+1})} = 1 - 1 = 0 \end{matrix}$

$R_f = [0, 1)$

الف) $y = \sqrt{-x^2+6x-1} \rightarrow \begin{cases} x = \frac{-b}{2a} = 3 \\ 3 \end{cases}$

$R_y = \sqrt{(-\infty, 3]} \Rightarrow R_y = [0, \sqrt{3}]$

۲-۴

ب) $y = \sqrt[3]{2x^2-11x} \rightarrow \begin{cases} x = \frac{-b}{2a} = 2 \\ -11 \end{cases}$

$\Rightarrow R_y = \sqrt[3]{[-11, +\infty)} \Rightarrow R_y = [-2, +\infty)$

الف) $y = \log(x^2-x+1) \rightarrow 3x^2-1=0 \Rightarrow x^2=\frac{1}{3} \Rightarrow x=\pm\frac{1}{\sqrt{3}} \rightarrow f(\frac{1}{\sqrt{3}}) > 0$

$\rightarrow x^2-x+1 > 0 \Rightarrow R_y = \mathbb{R}$ ✓

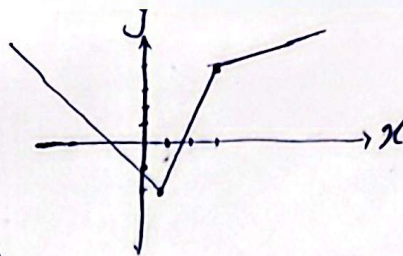
۲-۵

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

$x + \frac{1}{x} \rightarrow \begin{matrix} [1, +\infty) \checkmark \\ (-\infty, -1] \times \end{matrix} \rightarrow \lim_{x \rightarrow \pm\infty} y = 1$

$R_y = [1, +\infty)$

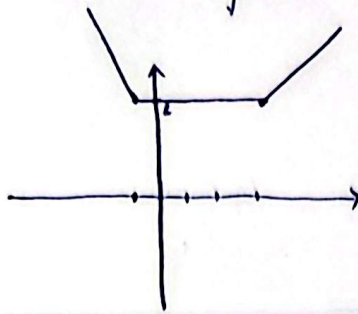
الف) $y = |2x-2| - |x-3|$



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

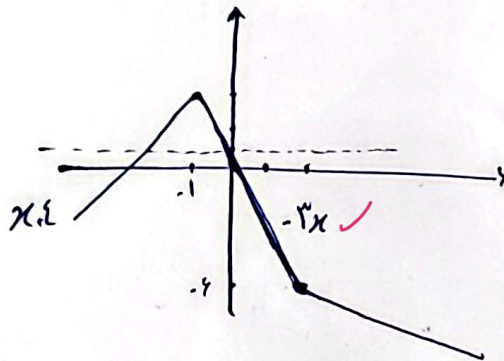
(2) - 2

ب) $y = |x-3| + |x+1|$



$R_y = [4, +\infty)$

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



$-2x = 1 \quad x = -\frac{1}{2}$

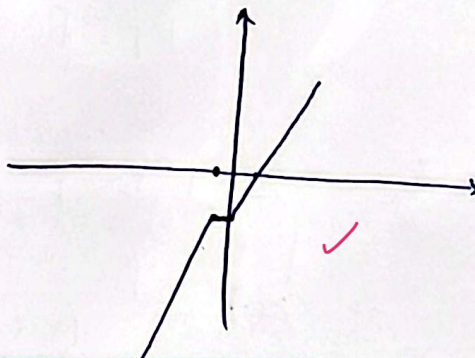
$x+2=1 \quad x=-3$

$D_f = \mathbb{R} - (-3, -\frac{1}{2})$

(2) - 5

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

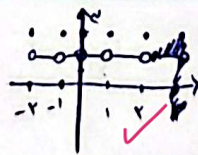
$$\begin{cases} x \geq 0 & 3x - 2x - 1 + x = 2x - 1 \\ -\frac{1}{2} < x < 0 & 3x - 2x - 1 - x = -1 \\ x \leq -\frac{1}{2} & 3x - 2x + 1 - x = 2x + 1 \end{cases}$$



$R_y = \mathbb{R}$

(2) - 8

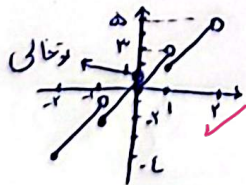
الف) $y = [x] + [2-x] = [x] + [-x] + 2$



$R_y = \{2, 3\}$

(2) - 9

ب) $y = 3x - [x]$



$R_y = [-1, \infty)$

الف) $y = \sin^2 x - \sin x + 1$

$\begin{cases} \sin^2 = 1 & (-1)^2 - (-1) + 1 = 3 \\ \sin^2 = \frac{1}{4} & (\frac{1}{2})^2 - (\frac{1}{2}) + 1 = \frac{5}{4} \\ \sin^2 = 0 & (0)^2 - (0) + 1 = 1 \end{cases}$

$R_y = [\frac{5}{4}, 3]$

(2) - 10

ب) $y = \sin^2 x + \sin^2 x + 1$

$\begin{cases} \sin^2 = 1 & (1)^2 + (1) + 1 = 3 \\ \sin^2 = 0 & (0)^2 + (0) + 1 = 1 \\ \frac{-b}{2a} = -\frac{1}{2} < 0 \quad X \end{cases}$

$R_y = [1, 3]$