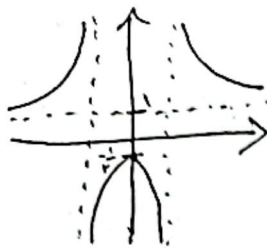


الف) $y = \begin{cases} x \geq 0 & \frac{x+1}{x-2} \\ x < 0 & \frac{x-1}{x+2} \end{cases}$



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

ب) $y = \begin{cases} x \geq 0 & \Rightarrow x + \frac{1}{x} \geq 2 \\ x < 0 & \Rightarrow x + \frac{1}{x} \leq -2 \end{cases}$

$\Downarrow$
 $-(x + \frac{1}{x}) \geq 2$

$R = [2, +\infty)$

(2)

1

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

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

$\Rightarrow y^2 - 4y + 4 + 4y^2 + 8 \geq 0 \Rightarrow 5y^2 - 4y + 12 \geq 0 \Rightarrow (y+2)(y+6) \geq 0$

$\Rightarrow y \leq -6 \text{ یا } y \geq -2 \Rightarrow R = (-\infty, -6] \cup [-2, +\infty)$

(2)

2

$t = x^2 - x = x^2 - x + \frac{1}{4} - \frac{1}{4} = (x - \frac{1}{2})^2 - \frac{1}{4} \Rightarrow t \geq -\frac{1}{4}$

$f(x) = \frac{x^2 - x + \frac{1}{4}}{x^2 - x + 1} = \frac{t + \frac{1}{4}}{t + 1}$

$t = -\frac{1}{4} \Rightarrow f_{\min} = 0$
 $t = +\infty \Rightarrow f_{\max} = 1$

$\Rightarrow R = [0, 1]$

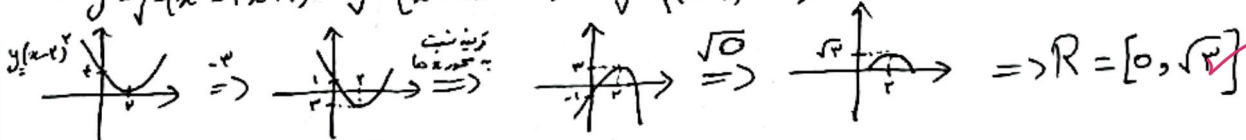
دافنه؟

مخرج محدوده نیست $\mathbb{R}$

(2)

3

الف) $y = \sqrt{-(x^2 - 4x + 4)} = \sqrt{-(x^2 - 4x + 4 - 3)} = \sqrt{-(x-2)^2 + 3}$



ب) $y = \sqrt[3]{2x^2 - 8x} = \sqrt[3]{2(x^2 - 4x)} = \sqrt[3]{2(x^2 - 4x + 4 - 4)} = \sqrt[3]{2(x-2)^2 - 8}$ عبارت زیر رادیکال غیر از 3 بر رفته است. $\Rightarrow y \geq \sqrt[3]{-8} \Rightarrow y \geq -2 \Rightarrow R = [-2, +\infty)$

$\Rightarrow y \geq \sqrt[3]{-8} \Rightarrow y \geq -2 \Rightarrow R = [-2, +\infty)$

(2)

4

الف) دامنه و برد توابع درجه 3 $\mathbb{R}$ است

پس تابع جابجی نگاریم به خودی خود محدودیتی ندارد و برد تابع نگاریم هم $\mathbb{R}$ می شود.

$\Rightarrow R = \mathbb{R}$

ب) $y = \log_2(x + \frac{1}{x})$ $\frac{x + \frac{1}{x}}{a + \frac{1}{a}} \geq 2 \Rightarrow x + \frac{1}{x} \geq 2 \Rightarrow \log_2(x + \frac{1}{x}) \geq 1 \Rightarrow R = [1, +\infty)$

(2)

5

الف) $y = |2x-2| - |x-3|$

$\frac{-1}{-x-1} \quad \frac{2}{3x-2} \quad \frac{1}{x+1}$ $\Rightarrow$ $\Rightarrow R = [-2, +\infty)$

ب) $y = |x-2| + |x+1|$

$\frac{1}{x-2} \quad \frac{1}{x+1}$ $\Rightarrow$ $\Rightarrow R = [1, +\infty)$

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

$\frac{-1}{x+2} \quad \frac{2}{-3x} \quad \frac{-1}{-x-2}$ $\Rightarrow$ $\Rightarrow R = (-\infty, -1]$

$|x-2| - |2x+2| \leq 1$
 $x \leq -3 \leq x \geq -\frac{1}{3}$
 $\Rightarrow R = (-\infty, -3] \cup [-\frac{1}{3}, +\infty)$

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

$\frac{-1}{2x+2} \quad \frac{0}{x} \quad \frac{1}{x}$ $\Rightarrow$ $\Rightarrow R = \mathbb{R}$

الف) $y = [x] + [-x] + 2$

$[x] + [-x] = 0 \text{ or } -1 \Rightarrow [x] + [-x] + 2 = 2 \text{ or } 1$
 $R = \{1, 2\}$

ب) $y = \begin{cases} 2x+2 & -2 \leq x < -1 \\ 2x+1 & -1 \leq x < 0 \\ 2x & 0 \leq x < 1 \\ 2x-1 & 1 \leq x < 2 \\ 2x-2 & x \geq 2 \end{cases}$

$\Rightarrow$ $\Rightarrow R = [-2, 2]$

الف) $y = \sin^2 x - \sin x + 1$

$-1 < \sin x \leq 1 \Rightarrow \frac{b}{a} = \frac{1}{4}$ $\Rightarrow \begin{cases} \sin x = 1 \Rightarrow y = 1 \\ \sin x = -1 \Rightarrow y = 3 \\ \sin x = \frac{1}{4} \Rightarrow y = \frac{17}{16} \end{cases} \Rightarrow \frac{17}{16} \leq y \leq 3 \Rightarrow R = [\frac{17}{16}, 3]$

ب) $y = \sin^4 x + \sin^2 x + 1$

$0 \leq \sin^2 x \leq 1 \Rightarrow \frac{b}{a} = \frac{-1}{4} \Rightarrow \begin{cases} \sin^2 x = 1 \Rightarrow y = 3 \\ \sin^2 x = 0 \Rightarrow y = 1 \end{cases} \Rightarrow R = [1, 3]$