

داده شده

محل

$$\begin{aligned} -x \{ f(-x) - x f(x) \} &= |x| + 1 \\ f(x) + x f(-x) &= |x| + 1 \end{aligned}$$

$$\begin{cases} -x f(-x) + x^2 f(x) = -|x| - x \\ x f(-x) + f(x) = |x| + 1 \end{cases}$$

$$\begin{aligned} -x^2 f(x) + f(x) &= -|x| + |x| + 1 - x \\ \rightarrow (x^2 + 1) f(x) &= -|x| + |x| - x + 1 \end{aligned}$$

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

$$f(x) = \begin{cases} \frac{-x^2 + x + 1}{x^2 + 1} & x \geq 0 \\ \frac{+x^2 - x + 1}{x^2 + 1} & x < 0 \end{cases}$$

$$f(x) + f(0) = x^2 - 5x + 7 \quad x=0 \rightarrow f(0) = 7 \rightarrow f(0) = 5$$

$$\rightarrow f(x) = x^2 - 5x + 5 \quad x=x^2 \rightarrow f(x^2) = x^4 - 5x^2 + 5$$

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

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

$$y^2 - 4y - 4 = 0 \rightarrow (y-4)(y+1) = 0 \rightarrow y = -1 \quad \frac{-1}{+} \quad \frac{4}{-}$$

$$R_f = (-\infty, -1] \cup [4, +\infty)$$

$$\text{الف) } y = 2x^2 - 5x + 1 \quad \min \left| \frac{-b}{2a} = \frac{5}{4} \right|$$

$$R_y = \left[\frac{-11}{4}, +\infty \right)$$

$$\text{ب) } y = \sqrt{-x^2 + 4x - 8} \quad \max \left| \frac{4}{-2} + 1 = -1 \right| \quad R_y = \sqrt{(-\infty, 5]}$$

$$R_y = [0, 5]$$

$$\text{ج) } y = \sqrt{x^2 - 5x^2 + 5x + 1}$$

$$\text{د) } R_y = \sqrt{\mathbb{R}} \rightarrow R = [0, +\infty)$$



2) $y = \log(x^2 - 4x + 1)$ $\rightarrow R_y = \mathbb{R}$

3) $y = \frac{x+1}{x-4}$ $R_y = \mathbb{R} - \left\{\frac{c}{a}\right\} \rightarrow R_y = \mathbb{R} - \left\{\frac{1}{-4}\right\}$ (2) (2)

4) $y = \sqrt{\frac{x+1}{x-1}}$ $R_y = \sqrt{\mathbb{R} - \{1\}} \rightarrow R_y = [0, +\infty) - \{1\}$

5) $y = \frac{x^2+5}{\sqrt{x^2+5}} = \frac{x^2+5}{\sqrt{x^2+5}} + \frac{1}{\sqrt{x^2+5}} = \sqrt{x^2+5} + \frac{1}{\sqrt{x^2+5}}$

6) $\min_{x=0} \rightarrow \sqrt{5} + \frac{1}{\sqrt{5}} = \sqrt{5} + \frac{\sqrt{5}}{5} = \frac{6\sqrt{5}}{5}$ $R_y = \left[\frac{6\sqrt{5}}{5}, +\infty\right)$

7) $y = x^2 + \frac{1}{x^2+5}$ $\min_{x=0} \rightarrow 0 + \frac{1}{5} = \frac{1}{5}$ $R_y = \left[\frac{1}{5}, +\infty\right)$

8) $y = \frac{3x^2+5}{x^2-1} \rightarrow yx^2 - y = 3x^2 + 5$
 $\rightarrow (y-3)x^2 = y+5 \rightarrow x^2 = \frac{y+5}{y-3}$ (2) (2)

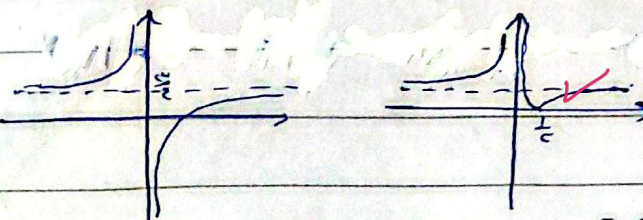
$\rightarrow x = \pm \sqrt{\frac{y+5}{y-3}}$ $\frac{y+5}{y-3} \geq 0$ $\frac{-5}{+3} \leq \frac{y}{-3} \leq \frac{+5}{-3}$ $R_y = (-\infty, -\frac{5}{3}] \cup (\frac{5}{3}, +\infty)$

9) $y = \frac{3x^2+5}{x^2-1}$ $\begin{matrix} x=0 \rightarrow y=-5 \\ x \rightarrow \infty \rightarrow y=3 \end{matrix}$ $R_y = (-\infty, -5] \cup (3, +\infty)$

10) $f(x) = \frac{r \sin x + 5}{\sin x - r}$ $\begin{matrix} \sin x = 1 \rightarrow \frac{r}{-r} = -1 \\ \sin x = -1 \rightarrow \frac{r}{-r} = 1 \\ \frac{c}{a} = r \rightarrow X \end{matrix}$ $R_f = [-1, 1]$ (2) (2)

11) $y = \left| \frac{x-1}{x} \right|$

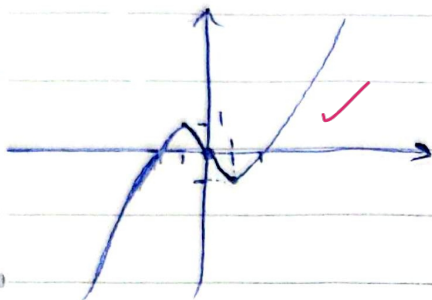
$R_y = [0, +\infty)$



$$y = \sqrt{\frac{9x-18}{-1+5x}} = \sqrt{\frac{9(x-2)}{5(x-2)}} = \frac{3}{\sqrt{5}} \quad R_y = \left\{ \frac{3}{\sqrt{5}} \right\}$$

$$y = x/|x| - 1/x \quad y = \begin{cases} x^2 - 1/x & x > 0 \\ 0 & x = 0 \\ -x^2 - 1/x & x < 0 \end{cases}$$

(2) (9)

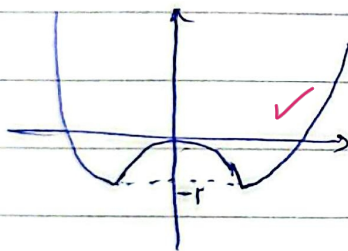


$$R_y = \mathbb{R}$$

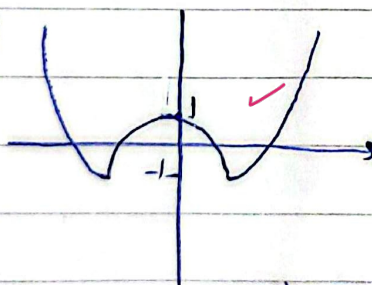
$$y = |f(x) + 1|$$

(2) (10)

$$y = f(x)$$



$$y = f(x) + 1$$



$$y = |f(x) + 1|$$

