

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

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

$$f(x) + f(0) = x^2 - 3x + 4$$

$$x=0 \rightarrow 2f(0) = 4 \rightarrow f(0) = 2 \rightarrow f(x) = x^2 - 3x + 2$$

$$f(x^2) = x^4 - 3x^2 + 2$$

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

$$(1-y)^2 - 4(y+2) \geq 0 \quad y^2 - 4y - 7 \geq 0 \quad \begin{matrix} -1 & 7 \\ + & - \end{matrix} \quad R = (-\infty, -1] \cup [7, +\infty) \quad \Delta > 0$$

$$y = \sqrt{x^2 + 4x + 4} \quad \begin{cases} x_{\min} = \frac{-b}{2a} = \frac{-4}{2} = -2 \\ y_{\min} = 2 \end{cases} \quad (-)$$

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

$$y = \log(x^2 - 4x + 4) \quad (+)$$

$$R = (-\infty, +\infty)$$

$$x_{\min} = \frac{-b}{2a} = \frac{0}{2} = 0 \quad y_{\min} = \frac{-14}{1} = -14 \quad (اف)$$

$$R = [-14, +\infty)$$

$$y = \sqrt{x^2 - 12x + 16} \quad (+)$$

$$R = [0, +\infty)$$

$$y = \sqrt{\frac{6x+1}{x-2}} \quad (-) \quad R = [0, +\infty) - \{2\}$$

$$y = \frac{x^2+1}{x-4} \quad (اف) \quad R = R - \left\{ \frac{4}{5} \right\}$$

$$x^2 + \frac{1}{x^2} - 4 \xrightarrow{\min x^2 = 0} \left[4 + \frac{1}{4} + \infty \right) = \left[\frac{17}{4} + \infty \right) - 4 = \left[\frac{1}{4} + \infty \right)$$

$$y = \frac{x^2 + 1}{\sqrt{x^2 + 4}} = \frac{x^2 + 1}{\sqrt{x^2 + 4}} = \sqrt{x^2 + 4} + \frac{1}{\sqrt{x^2 + 4}} \quad (+) \quad R = \left[\frac{5}{2}, +\infty \right)$$

$$y = \frac{x^2 + 4}{x^2 - 1}$$

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$$R = (-\infty, -1] \cup (1, +\infty)$$

$$y - y = \frac{x^2 + 4}{x^2 - 1} - y \rightarrow -1 \cdot y = \frac{x^2 + 4}{x^2 - 1} - y$$

$$x^2 = \frac{y + 4}{y - 1}$$

$$R = (-\infty, -1] \cup (1, +\infty)$$

$$f(x) = \frac{x \sin x + 4}{x \sin x - 4}$$

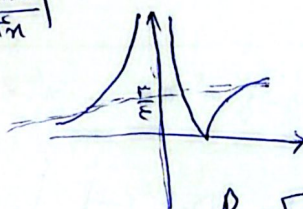
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$$[-4, \frac{1}{4}]$$

$$y = \sqrt{\frac{9x - 18}{-1 + 4x}} = \sqrt{\frac{9(x-2)}{4(x-1)}} = \sqrt{\frac{9}{4}} = \frac{3}{2}$$

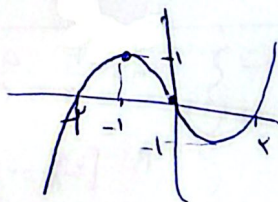
$$R = \left\{ \frac{3}{2} \right\}$$

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

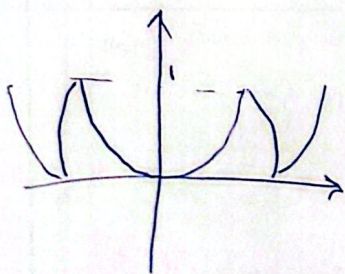


$$R = [0, +\infty)$$

$$y = \begin{cases} x^2 - 2x & x \neq 0 \\ 0 & x = 0 \end{cases}$$



$$R = (-\infty, 1] \cup [-1, +\infty) = \mathbb{R}$$



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