

الف) $y = \frac{x+3}{2x^3+3x^2-11x+3} \xrightarrow{\text{تقسیم بر } x-1} \frac{(2x^2+5x-3)}{(x+3)(2x-1)}$ $y = \frac{x+3}{(x-1)(x+3)(2x-1)}$ $x=1 \quad x=-3 \quad x=\frac{1}{2}$ $D = \mathbb{R} - \{1, \frac{1}{2}, -3\}$	ب) $y = \frac{x+3}{2x^3+9x^2+11x+3} \xrightarrow{\text{تقسیم بر } x+1} \frac{(2x^2+7x+3)}{(x+3)(2x+1)}$ $y = \frac{x+3}{(x+1)(x+3)(2x+1)}$ $x=-1 \quad x=-3 \quad x=-\frac{1}{2}$ $D = \mathbb{R} - \{-1, -3, -\frac{1}{2}\}$	۱
الف) $y = \frac{x+3}{x^3-2x^2+2x-1} \xrightarrow{\text{تقسیم بر } x-1} \frac{(x^2-x+1)}{x-1}$ $y = \frac{x+3}{(x-1)(x^2-x+1)}$ $\Delta = b^2 - 4ac = 1 - 4 = -3$ چون Δ منفی است پس هیچ جوابی ندارد. $D = \mathbb{R} - \{1\}$	ب) $y = \frac{x+3}{x^3-2x^2+2x-1} \xrightarrow{\text{تقسیم بر } x-1} \frac{(x^2-x+1)}{x-1}$ $x=-3$ $y = \frac{x+3}{(x-1)(x^2-x+1)} \geq 0$ $\frac{x+3}{x-1} \geq 0$ $\frac{-3}{-1} \quad \frac{+}{-} \quad \frac{-}{+}$ $D = (-\infty, -3] \cup (1, +\infty)$	۲
$y = \frac{2}{x^2-\omega(x-1)-2x+d}$ ① $x > 1 \rightarrow x^2 - \omega x + d - 2x + d \rightarrow x^2 - 2x + d + d \rightarrow x^2 - 2x + 1$ $(x-1)(x-1) = 0 \rightarrow x \neq 1$ ② $x = 1 \rightarrow \Delta = b^2 - 4ac = 4 - 4(d) = -4$ چون Δ منفی است پس هیچ جوابی ندارد. ③ $x < 1 \rightarrow x^2 + \omega x - d - 2x + d \rightarrow x^2 + 3x = 0 \rightarrow x(x+3) = 0$ $x \neq 0$ $x \neq -3$ ① و ② و ③ $D = \mathbb{R} - \{1, -3, 0, d, \omega\}$		۳
الف) $y = \frac{x+3}{ 2x+1 - x+3 }$ $2x+1 - x+3 \neq 0 \rightarrow 2x+1 = x+3$ $\rightarrow (2x+1)^2 = (x+3)^2 \rightarrow 4x^2+4x+1 = x^2+6x+9$ $\rightarrow 3x^2-2x-8 = 0 \rightarrow x^2-2x-2\frac{2}{3} = 0$ $\rightarrow (x-4)(x+\frac{1}{3}) = 0 \rightarrow x = \frac{4}{3} \text{ یا } x = -\frac{1}{3}$ $D = \mathbb{R} - \{2, -\frac{4}{3}\}$	ب) $y = \sqrt{ 2x+1 - x+3 }$ $2x+1 - x+3 \geq 0 \rightarrow 2x+1 \geq x+3$ $\rightarrow (2x+1)^2 \geq (x+3)^2 \rightarrow 4x^2+4x+1 \geq x^2+6x+9$ $\rightarrow 3x^2-2x-8 \geq 0 \rightarrow x^2-2x-2\frac{2}{3} \geq 0$ $\rightarrow (x-4)(x+\frac{1}{3}) \geq 0 \rightarrow x \leq -\frac{1}{3} \text{ یا } x \geq 4$ $D = (-\infty, -\frac{1}{3}] \cup [4, +\infty)$	۴
الف) $y = \log_v \frac{(1-\log_v x)}{x}$ ① $x > 0$ ② $1 - \log_v x > 0 \rightarrow 1 > \log_v x \rightarrow 3 > x$ $D = ① \cap ② = (0, 3)$	ب) $y = \log_v \frac{(1-\log_v \frac{1}{x})}{\frac{1}{x}}$ ① $x > 0$ ② $1 - \log_v \frac{1}{x} > 0 \rightarrow 1 > \log_v \frac{1}{x} \rightarrow \frac{1}{x} < 3$ $D = ① \cap ② = (\frac{1}{3}, +\infty)$	۵

$$f(x) = \sqrt{\log_{\frac{1}{2}} \frac{x-1}{x}}$$

$$\textcircled{1} x-1 > 0 \rightarrow x > 1 \rightarrow x > \frac{1}{x}$$

$$\textcircled{2} \log_{\frac{1}{2}} \frac{x-1}{x} \geq 0 \rightarrow x-1 > 1 \rightarrow x > 2 \rightarrow x > 1$$

$$\textcircled{3} \log_{\frac{1}{2}} \frac{x-1}{x} \geq 0 \rightarrow \log_{\frac{1}{2}} \frac{x-1}{x} \leq 1 \rightarrow x-1 \leq 2 \rightarrow x \leq 3 \rightarrow x \leq 2$$

$$D = \textcircled{1} \cap \textcircled{2} \cap \textcircled{3} = (1, 2]$$

$$\text{مثال } y = \log(x \cos x + 1)$$

$$x \cos x + 1 > 0 \rightarrow x \cos x > -1 \rightarrow \cos x > -\frac{1}{x}$$

$$D = (2k\pi + \frac{\pi}{2}, 2k\pi + \frac{3\pi}{2})$$

$$\text{مثال } y = \sqrt{\log \frac{x-1}{x+1}}$$

$$\textcircled{1} \frac{x-1}{x+1} > 0 \rightarrow \frac{-1}{x+1} > 0$$

$$\textcircled{2} \log \frac{x-1}{x+1} \geq 0 \rightarrow \frac{x-1}{x+1} \geq 1 \rightarrow \frac{x-1}{x+1} - 1 \geq 0$$

$$\rightarrow \frac{x-1-x-1}{x+1} \geq 0 \rightarrow \frac{-2}{x+1} \geq 0 \rightarrow \frac{-1}{x+1} > 0$$

$$D = \textcircled{1} \cap \textcircled{2} = (-\infty, -1)$$

$$f(x) = \sqrt{(a+x)x^2 + ax + b} \rightarrow D = (-\infty, 2]$$

$$a = -2 \rightarrow \sqrt{-2x + b}$$

$$-2x + b \geq 0 \rightarrow -2x \geq -b \rightarrow x \leq \frac{b}{2} \xrightarrow{D = (-\infty, 2]} \frac{b}{2} = 2 \rightarrow b = 4$$

$$f(x) = \sqrt{x^2 + 2x + 2 - m^2}$$

$$\Delta \leq 0 \rightarrow b^2 - 4ac \leq 0 \rightarrow 4 - 4(2 - m^2) \leq 0 \rightarrow \frac{4}{-4} + 4m^2 \leq 0 \rightarrow 4m^2 \leq -1 \rightarrow m^2 \leq -\frac{1}{4}$$

$$\rightarrow -1 \leq m \leq 1$$

$$\text{مثال } \rightarrow 1 - (-1) = 2$$

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

$$\textcircled{1} x-x^2 \geq 0 \rightarrow x \geq x^2 \rightarrow x \geq x \geq -x^2$$

$$\textcircled{2} [x] + [-x] + 1 \neq 0 \rightarrow [x] + [-x] \neq -1 \rightarrow \begin{cases} [x] + [-x] = 0 \rightarrow x \in \mathbb{Z} \checkmark \\ [x] + [-x] = -1 \rightarrow x \notin \mathbb{Z} \times \end{cases}$$

$$D = \textcircled{1} \cap \textcircled{2} = \{-2, -1, 0, 1, 2\}$$

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