

۱, ۱, ۲, ۵

۱۳, ۷, ۵

الف) $y = \frac{x+2}{x^3 - 2x^2 + 3x - 10} = \frac{x^3 - 2x^2 + 3x - 10}{x-1} = x^2 - 14x + 10$

$D_f = \mathbb{R} - \left\{ \frac{1}{2}, \frac{10}{2} \right\}$

$\leftarrow (x-1)(x-1)$

$\leftarrow \begin{cases} x = \frac{10}{2} \\ x = \frac{1}{2} \end{cases}$

ب) $y = \frac{x+3}{x^3 - x^2 - 12x - 4} = \frac{x^3 - x^2 - 12x - 4}{x+1} = x^2 - 4x - 4$

$D_f = \mathbb{R} - \left\{ 2, -\frac{2}{3} \right\} - 1$

$\leftarrow (x-4)(x+2)$

$\leftarrow \begin{cases} x = \frac{4}{3} = 1 \\ x = -\frac{2}{3} \end{cases}$

ج) $y = \frac{x+1}{x - \sqrt{3-2x}}$

$\rightarrow \begin{cases} 3-2x \geq 0 \rightarrow 3 \geq 2x \rightarrow x \leq \frac{3}{2} \\ x - \sqrt{3-2x} \neq 0 \rightarrow x \neq \sqrt{3-2x} \rightarrow x^2 \neq 3-2x \rightarrow x^2 + 2x \neq 3 \\ \rightarrow x(x+2) \neq 3 \rightarrow x \neq 1 \end{cases}$

$\Rightarrow D_f = (-\infty, \frac{3}{2}] - \{1\}$

د) $y = \frac{x+2}{x - \sqrt{3x-2}}$

$\rightarrow \begin{cases} 3x-2 \geq 0 \rightarrow 3x \geq 2 \rightarrow x \geq \frac{2}{3} \\ x - \sqrt{3x-2} \neq 0 \rightarrow x \neq \sqrt{3x-2} \rightarrow x^2 \neq 3x-2 \rightarrow x^2 - 3x + 2 \neq 0 \\ \rightarrow (x-1)(x-2) \neq 0 \rightarrow x \neq 1, x \neq 2 \end{cases}$

$D_f = \left[\frac{2}{3}, +\infty \right) - \{1, 2\}$

ه) $y = \frac{\sin x}{x \cos x - 1}$

$\rightarrow x \cos x - 1 \neq 0 \rightarrow x \cos x \neq 1 \rightarrow \cos x \neq \frac{1}{x} \rightarrow D_f = \mathbb{R} - \left\{ 2k\pi + \frac{\pi}{2}, 2k\pi + \frac{5\pi}{2} \right\}$

و) $y = \frac{\cos x + 1}{x \sin x + 1}$

$\rightarrow x \sin x + 1 \neq 0 \rightarrow x \sin x \neq -1 \rightarrow \sin x \neq -\frac{1}{x} \rightarrow D_f = \mathbb{R} - \left\{ 2k\pi + \frac{3\pi}{2}, 2k\pi + \frac{7\pi}{2} \right\}$

ز) $y = \frac{\tan x + 2}{\cot x - 1}$

$\rightarrow \begin{cases} \cos x \neq 0 \\ \cot x - 1 \neq 0 \rightarrow \cot x \neq 1 \end{cases} \rightarrow D_f = \mathbb{R} - \left\{ k\pi + \frac{\pi}{4}, k\pi + \frac{5\pi}{4} \right\}$

$\sin x \neq 0$

ح) $y = \frac{\sin x + 1}{x \sin^2 x - 3}$

$\rightarrow x \sin^2 x - 3 \neq 0 \rightarrow x \sin^2 x \neq 3 \rightarrow \sin^2 x \neq \frac{3}{x} \rightarrow \sin x \neq \pm \sqrt{\frac{3}{x}} \rightarrow D_f = \mathbb{R} - \left\{ k\pi + \frac{\pi}{2}, k\pi - \frac{\pi}{2} \right\}$

ط) $x^2 - 6x + 4 > 0 \rightarrow (x-2)(x-4) > 0$

$\rightarrow D_f = (-\infty, 2) \cup (4, +\infty)$

ث) $x^2 - 4x + 6 < 0 \rightarrow (x-1)(x-5) < 0$

$\rightarrow D_f = (1, 5)$

ج) $x^2 + 4x + 5 > 0 \rightarrow (x+1)(x+5) > 0$

$\rightarrow D_f = (-\infty, -5] \cup [-1, +\infty)$

$$3) x^2 - 4x + 4 \leq 0 \rightarrow (x-1)(x-4) \leq 0 \rightarrow \frac{+}{-} \frac{+}{+} \rightarrow D_f = [1, 4]$$

$$\text{الف) } \frac{x^2 - 3x + 2}{x - 2} < 0 \rightarrow \begin{cases} (x-1)(x-2) < 0 \rightarrow \frac{+}{-} \frac{+}{+} \rightarrow (1, 2) \\ x-2 \neq 0 \rightarrow x \neq 2 \end{cases} \rightarrow D_f = (1, 2) \quad \textcircled{1}$$

$$\text{ب) } \frac{x^2 - 1}{x^2 - 4x + 4} \geq 0 \rightarrow \begin{cases} (x-1)(x+1) \geq 0 \rightarrow \frac{+}{+} \frac{+}{+} \rightarrow (-\infty, -1] \cup [1, +\infty) \\ x^2 - 4x + 4 \neq 0 \rightarrow (x-1)(x-2) \neq 0 \rightarrow x \neq 1, x \neq 2 \end{cases}$$

$$\Rightarrow D_f = (-\infty, -1] \cup (1, 2) \cup (2, +\infty)$$

$$\text{الف) } y = \sqrt{\frac{x^2 - 4x + 3}{x^2 - 1}} \rightarrow \begin{cases} \frac{(x-1)(x-3)}{(x-1)(x+1)} \geq 0 \rightarrow \frac{+}{-} \frac{+}{+} \rightarrow [3, +\infty) \\ x^2 - 1 \neq 0 \rightarrow x \neq \pm 1 \end{cases} \rightarrow D_f = [3, +\infty) \quad \textcircled{2}$$

$$\text{ب) } y = \sqrt{\frac{x^2 - 4x + 3}{x^2 - 1}} \rightarrow x^2 - 1 \neq 0 \rightarrow (x-1)(x+1) \neq 0 \rightarrow x \neq 1, x \neq -1 \rightarrow D_f = \mathbb{R} - \{1, -1\}$$

$$\text{الف) } y = \log(x^2 - 3x) \rightarrow x^2 - 3x > 0 \rightarrow x(x-3) > 0 \rightarrow \frac{+}{-} \frac{+}{+} \rightarrow (0, 3) \cup (3, +\infty) \quad \textcircled{1}$$

$$\text{ب) } y = \log \frac{14 - x^2}{|x| - 2} \rightarrow \begin{cases} 14 - x^2 > 0 \rightarrow (x-4)(x+2) < 0 \rightarrow (-2, 4) \\ |x| - 2 > 0 \rightarrow |x| > 2 \rightarrow x < -2 \text{ or } x > 2 \\ |x| - 2 \neq 0 \rightarrow |x| \neq 2 \rightarrow x \neq \pm 2 \end{cases} \Rightarrow D_f = (-2, -2) \cup (2, 4) - \{ \pm 2 \}$$

$$\text{ج) } y = \log \frac{x^2 - 4x + 3}{10 - x} \rightarrow \begin{cases} \frac{x^2 - 4x + 3}{x - 3} = \frac{(x-3)(x-1)}{x-3} > 0 \rightarrow \frac{+}{-} \frac{+}{+} \rightarrow (1, +\infty) \\ 10 - x > 0 \rightarrow x < 10 \\ 10 - x \neq 0 \rightarrow x \neq 10 \end{cases} \Rightarrow D_f = (1, 10) - \{10\}$$

$$\text{د) } y = \sqrt{x^2 - 11x + 28} + \log_x \sqrt{4x - 3} \rightarrow \begin{cases} x^2 - 11x + 28 \geq 0 \rightarrow (x-4)(x-7) \geq 0 \rightarrow (-\infty, 4] \cup [7, +\infty) \\ x > 0 \\ x \neq 1 \\ 4x - 3 > 0 \rightarrow x > \frac{3}{4} \end{cases}$$

$$\Rightarrow D_f = (0, 4] \cup [7, +\infty) - \{1\}$$

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

	-1	*	1	-1
x	-	-	+	+
x-1	-	-	-	+
x+1	-	+	+	+
p(x)	-	+	+	+

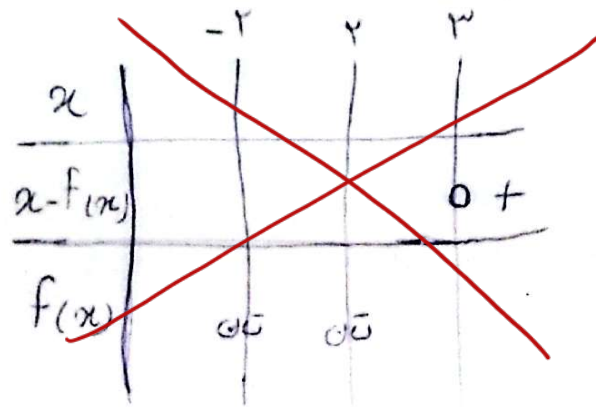
رشته‌ها باید در حدقل مشخص شود

$$y = \sqrt{\frac{x-f(x)}{f(x)}}$$

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$$\frac{x-f(x)}{f(x)} \geq 0 \Rightarrow f(x) \neq 0 \rightarrow x \neq -1 \checkmark$$

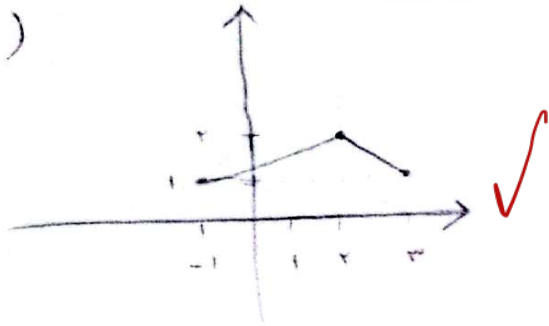
$$\downarrow \frac{x-f(x)}{f(x)} \geq 0 \Rightarrow x-f(x) \geq 0 \rightarrow x \geq f(x) \rightarrow x \geq -1 \checkmark$$



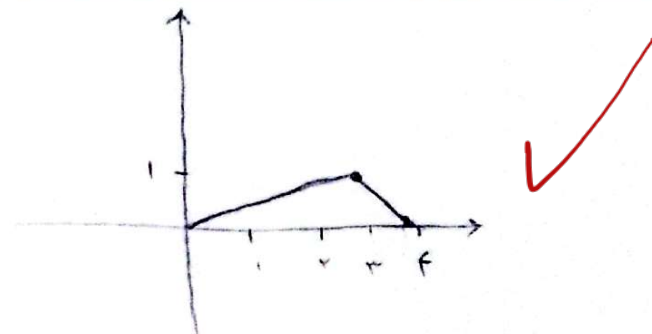
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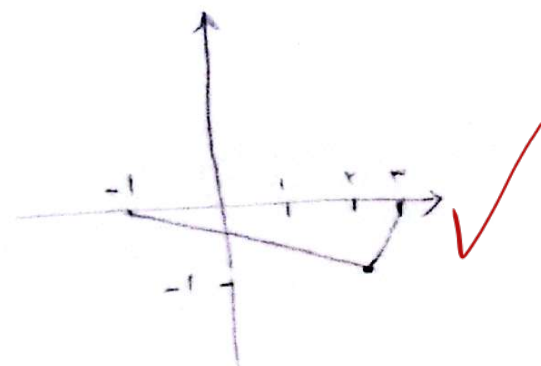
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