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الف) $\frac{x+5}{5x^3 - 10x^2 + 31x - 15} = \frac{(x-1)(x-1)(x-1)}{(x-1)(x-1)(x-1)} \rightarrow \neq 0 \rightarrow D_f = \mathbb{R} - \{1\}$

ب) $\frac{x+3}{x^3 - x^2 - 18x - 5} = \frac{(x+3)(x-1)(x-5)}{(x+3)(x-1)(x-5)} \rightarrow \neq 0 \rightarrow D_f = \mathbb{R} - \{-1\}$

الف) $y = \frac{x+1}{x-\sqrt{3-2x}} = \begin{cases} x-\sqrt{3-2x} \neq 0 \rightarrow x \neq \sqrt{3-2x} \rightarrow x^2 \neq 3-2x \rightarrow (x-1)(x+3) \neq 0 \rightarrow x \neq 1, x \neq -3 \\ 3-2x \geq 0 \rightarrow 3 \geq 2x \rightarrow x \leq 1.5 \end{cases} \rightarrow D_f = (-\infty, 1.5] - \{1\}$

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

الف) $y = \frac{\sin x}{1-\cos x} \rightarrow 1-\cos x \neq 0 \rightarrow \cos x \neq 1 \rightarrow D_f = \mathbb{R} - \{2k\pi + \frac{\pi}{2}, 2k\pi + \frac{5\pi}{2}\}$

ب) $y = \frac{\cos x + 1}{1 + \sin x} \rightarrow 1 + \sin x \neq 0 \rightarrow \sin x \neq -1 \rightarrow D_f = \mathbb{R} - \{2k\pi + \frac{3\pi}{2}, 2k\pi + \frac{7\pi}{2}\}$

ج) $y = \frac{\tan x + 1}{\cot x - 1} \rightarrow \begin{cases} \cot x \neq 1 \rightarrow x \neq k\pi + \frac{\pi}{4} \\ \sin x \neq 0 \rightarrow x \neq k\pi \end{cases} \rightarrow D_f = \mathbb{R} - \{k\pi, k\pi + \frac{\pi}{4}\}$

د) $y = \frac{\sin x + 1}{\sin^2 x - 3} \rightarrow \sin^2 x - 3 \neq 0 \rightarrow \sin^2 x \neq 3 \rightarrow \sin x \neq \pm \sqrt{3} \rightarrow D_f = \mathbb{R} - \{k\pi \pm \frac{\pi}{2}\}$

الف) $x^2 - 5x + 4 > 0 \rightarrow (x-1)(x-4) > 0 \rightarrow \frac{1}{x-1} > \frac{1}{x-4} \rightarrow D_f = (-\infty, 1) \cup (4, +\infty)$

ب) $x^2 - 4x + 5 < 0 \rightarrow (x-1)(x-5) < 0 \rightarrow \frac{1}{x-1} < \frac{1}{x-5} \rightarrow D_f = (1, 5)$

ج) $x^2 + 4x + 5 \geq 0 \rightarrow (x+1)(x+5) \geq 0 \rightarrow \frac{-1}{x+1} \geq \frac{-5}{x+5} \rightarrow D_f = (-\infty, -5] \cup [-1, +\infty)$

د) $x^2 - 7x + 4 \leq 0 \rightarrow (x-4)(x-1) \leq 0 \rightarrow \frac{1}{x-4} \leq \frac{1}{x-1} \rightarrow D_f = [1, 4]$

الف) $\frac{x^2 - 13x + 12}{x - 5} < 0 \rightarrow \frac{(x-1)(x-12)}{(x-5)} < 0 \rightarrow \frac{1}{x-1} > \frac{1}{x-12} \rightarrow D_f = (-\infty, 1) \cup (12, +\infty)$

ب) $\frac{x^2 - 1}{x^2 - 4x + 5} > 0 \rightarrow \frac{(x-1)(x+1)}{(x-1)(x-5)} > 0 \rightarrow \frac{-1}{x-1} > \frac{-1}{x-5} \rightarrow D_f = (-\infty, -1] \cup (5, +\infty)$

$$a) y = \sqrt{\frac{x^2 - \varepsilon x + 1}{x^2 - 1}} \rightarrow \frac{(x-1)(x-1)}{(x-1)(x^2+1)} \geq 0 \rightarrow \frac{1}{x-1} \geq 0 \rightarrow D_f = [1, +\infty)$$

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$$b) \sqrt{\frac{x^2 - \varepsilon x + 1}{x^2 - 1}} \rightarrow x^2 - 1 \neq 0 \rightarrow x^2 \neq 1 \rightarrow x \neq \pm 1 \rightarrow D_f = \mathbb{R} - \{\pm 1\}$$

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

$$b) y = \log \frac{14-x^2}{|x|-1} \begin{cases} 14-x^2 > 0 \rightarrow 14 > x^2 \rightarrow -\sqrt{14} < x < \sqrt{14} \\ |x|-1 > 0 \rightarrow |x| > 1 \rightarrow x > 1, x < -1 \\ |x|-1 \neq 0 \rightarrow x \neq \pm 1 \end{cases} \rightarrow D_f = (-\sqrt{14}, -1) \cup (1, \sqrt{14}) - \{\pm 1\}$$

$$c) y = \log \frac{x^2 - \sqrt{x} + 1}{10-x} \begin{cases} x^2 - \sqrt{x} + 1 > 0 \rightarrow \frac{(x-1)(x-1)}{x-1} \geq 0 \rightarrow x \geq 1 \\ 10-x > 0 \rightarrow x < 10 \\ 10-x \neq 0 \rightarrow x \neq 10 \end{cases} \rightarrow D_f = (1, 10) - \{10\}$$

$$d) y = \sqrt{x^2 - 11x + 18} + \log_x \frac{x^2 - \varepsilon x + 1}{x-1} \begin{cases} x^2 - 11x + 18 \geq 0 \rightarrow (x-2)(x-9) \geq 0 \rightarrow x \leq 2 \text{ or } x \geq 9 \\ x > 0, x \neq 1 \end{cases} \rightarrow D_f = (0, 2] \cup [9, +\infty) - \{1\}$$

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

روشن سریع:

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

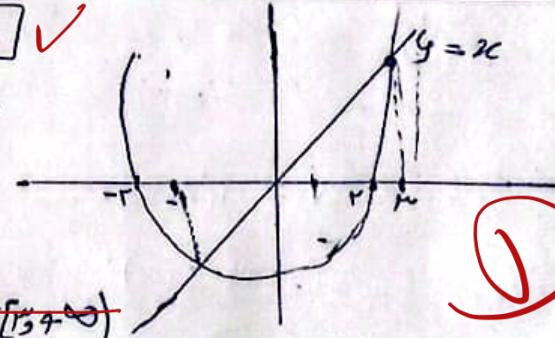
x	-1	0	1
$x^2 - x$	+	+	-
$x^2 + x$	+	-	+
	+	-	+

روشن آید زمانی:

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$$y = \sqrt{\frac{x - F(x)}{F(x)}} \begin{cases} F(x) \neq 0 \\ \frac{x - F(x)}{F(x)} \geq 0 \rightarrow x - F(x) \geq 0 \end{cases}$$

$$x = F(x) \rightarrow x = -1, 2$$



$$\frac{-1}{1} \frac{0}{1} \frac{1}{1}$$

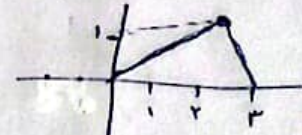
$$\rightarrow D_f = (-\infty, -1) \cup (1, 2) \cup (2, +\infty)$$



$$a) f(x) + 1 \Rightarrow$$



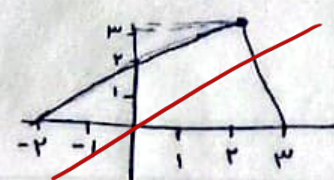
$$b) F(x-1) =$$



$$c) -F(x) =$$



$$d) F(x+1) + 1 =$$



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