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الف) $y = \frac{x+1}{x^2-2x+1}$

$$\begin{array}{r} x^2-2x+1 \overline{) x^2-14x+10} \\ \underline{+14x-14} \\ 10x-14 \end{array}$$

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$(x-1)(x-2)(x-3) \neq 0$

$$\begin{array}{r} -14x+14 \\ \underline{+14x-14} \\ 0 \end{array}$$

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

$x-1 \neq 0 \Rightarrow x \neq 1$

$x-2 \neq 0 \Rightarrow x \neq 2$

$x-3 \neq 0 \Rightarrow x \neq 3$

ب) $y = \frac{x+1}{x^2-1}$

$$\begin{array}{r} x^2-1 \overline{) x^2-1} \\ \underline{-(x^2-1)} \\ 0 \end{array}$$

$(x+1)(x-1) \neq 0$

$$\begin{array}{r} -x^2+1 \\ \underline{-(x^2-1)} \\ 0 \end{array}$$

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

$x+1 \neq 0 \Rightarrow x \neq -1$

$x^2-1 \neq 0 \Rightarrow x \neq \pm 1$

$(x+1)(x-1)$

$x = \frac{-1 \pm \sqrt{1-4}}{2} = \frac{-1 \pm \sqrt{-3}}{2}$

الف) $y = \frac{x+1}{x-\sqrt{x^2-1}}$

$x^2-1 \geq 0 \Rightarrow x \geq 1 \text{ or } x \leq -1$

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

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$x = -1 \Rightarrow -1 - \sqrt{1-1} = -1 - 0 = -1$

$x^2-1 \neq 0 \Rightarrow x \neq \pm 1$

ب) $y = \frac{x+1}{x-\sqrt{x^2-1}}$

$x^2-1 \geq 0 \Rightarrow x \geq 1 \text{ or } x \leq -1$

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

$x-\sqrt{x^2-1} \neq 0 \Rightarrow x \neq \sqrt{x^2-1}$

الف) $y = \frac{\sin x}{\cos x - 1}$

$\cos x - 1 \neq 0 \Rightarrow \cos x \neq 1 \Rightarrow x \neq 2k\pi$

$D_f = \mathbb{R} - \{2k\pi\}$

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

$\sin x + 1 \neq 0 \Rightarrow \sin x \neq -1 \Rightarrow x \neq \frac{3\pi}{2} + 2k\pi$

$D_f = \mathbb{R} - \left\{\frac{3\pi}{2} + 2k\pi\right\}$

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

$\cot x - 1 \neq 0 \Rightarrow \cot x \neq 1 \Rightarrow x \neq \frac{\pi}{4} + k\pi$

$D_f = \mathbb{R} - \left\{\frac{\pi}{4} + k\pi\right\}$

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

$\sin^2 x - 1 \neq 0 \Rightarrow \sin^2 x \neq 1 \Rightarrow \sin x \neq \pm 1$

$D_f = \mathbb{R} - \left\{\frac{\pi}{2} + k\pi, \frac{3\pi}{2} + k\pi\right\}$

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

ب) $x^2 - 4x + 4 < 0$ $(x-1)(x-4)$ $\frac{1}{+} \frac{4}{-} \frac{4}{+}$ $x \in (1, 4)$ 2

ج) $x^2 + 4x + 4 \geq 0$ $(x+2)(x+2)$ $\frac{-2}{+} \frac{-2}{-} \frac{-2}{+}$ $x \in (-\infty, -2] \cup [-2, +\infty)$ 3

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

الف) $x^2 - 2x + 1 < 0$ $(x-1)(x-1)$ $\frac{1}{-} \frac{1}{+} \frac{1}{-}$ $x \in (-\infty, 1) \cup (1, +\infty)$ 5

ب) $\frac{x^2 - 1}{x^2 - 4x + 4} \geq 0$ $\frac{(x-1)(x+1)}{(x-1)(x-2)}$ $\frac{-1}{+} \frac{1}{-} \frac{2}{-}$ $x \in (-\infty, -1] \cup (2, +\infty)$ 6

ج) $y = \sqrt{\frac{x^2 - 2x + 1}{x^2 - 1}}$ $\frac{(x-1)(x-1)}{(x-1)(x+1)} \geq 0$ $\frac{1}{-} \frac{1}{+} \frac{1}{-}$ $D_f = [1, +\infty)$ 7

د) $(x-1)(x+1) \neq 0$
 ب) $y = \sqrt{\frac{x^2 - 2x + 1}{x^2 - 1}}$ $(x-1)(x+1) \neq 0$ $D_f = \mathbb{R} - \{\pm 1\}$ 8

الف) $y = \log(x^2 - 2x)$ $x^2 - 2x > 0$ $x(x-2) > 0$ $\frac{0}{+} \frac{2}{-} \frac{2}{+}$ $D_f = (-\infty, 0) \cup (2, +\infty)$ 9

ب) $y = \log_{|x|-2}^{14-x^2}$ $14 - x^2 > 0 \rightarrow 14 > x^2 \rightarrow -\sqrt{14} < x < \sqrt{14}$ $D_f = (-\sqrt{14}, -2) \cup (2, \sqrt{14}) - \{\pm 1\}$
 $|x| - 2 > 0 \rightarrow |x| > 2$ $|x| - 2 \neq 1 \rightarrow |x| \neq 3$
 $x > 2$ $x < -2$ $x \neq \pm 1$

ج) $y = \log_{10=2x} \frac{x^2 - 2x + 1}{x - 2}$ $\frac{(x-1)(x-1)}{x-2} > 0$ $\frac{1}{-} \frac{1}{+} \frac{2}{-}$ $D_f = (2, 10) - \{1\}$
 $10 - 2x > 0 \rightarrow 2x < 10$ $10 - 2x \neq 1$ $x \neq 9$

د) $y = \sqrt{x^2 - 11x + 11} + \log_x \sqrt{14 - x^2}$ $\sqrt{14 - x^2} > 0$ $14 > x^2 \rightarrow -\sqrt{14} < x < \sqrt{14}$
 $(x-1)(x-1) > 0$ $x > 0$ $x \neq 1$ $D_f = (-\sqrt{14}, 1) \cup (1, \sqrt{14})$
 $\frac{1}{+} \frac{1}{-} \frac{1}{+} \rightarrow (-\infty, 1) \cup [1, +\infty)$ $\frac{1}{+} \frac{1}{-} \frac{1}{+} \rightarrow (-\infty, 1) \cup [1, +\infty)$

$y = \frac{x^2 - x}{x^2 + x} \rightarrow \frac{x(x-1)}{x(x+1)} \neq 0$ $\frac{-1}{+} \frac{1}{-} \frac{1}{+}$ 10

	-1	0	1
$x(x-1)$	+	+	-
$x(x+1)$	+	-	+
y	+	-	+

درین بازه‌ها عبارت منفی است

9. (1)

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

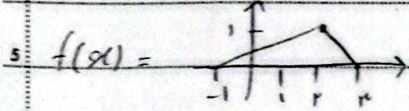
$$f(x) \neq 0 \rightarrow x \neq \pm \frac{1}{2}$$

$$\frac{x - f(x)}{f(x)} \geq 0$$

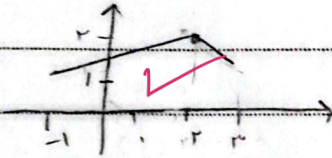
$$\frac{-2+1}{+} \frac{2}{-} \frac{2}{+} \frac{2}{+}$$

$$Df = (-\infty, -2) \cup [-1, 2) \cup [2, +\infty)$$

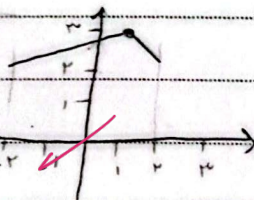
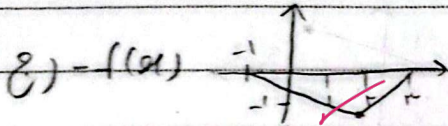
$$Df = (-2, -1] \cup (2, 3]$$



(الف) $f(x) + 1$



(ب) $f(x-1)$



د) $f(x+1) + 2$

