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الف) $\frac{x+2}{x^2-2x^2+11x-12}$
 $DP: R - \{1, 2, 3, 4\}$

$\frac{x^2-2x^2+11x-12}{x^2-2x^2+11x-12} = \frac{x-1}{x^2-14x+12}$
 $\frac{x^2-2x^2+11x-12}{x^2-2x^2+11x-12} = \frac{x-1}{x^2-14x+12}$
 $\frac{x^2-2x^2+11x-12}{x^2-2x^2+11x-12} = \frac{x-1}{x^2-14x+12}$
 $\frac{x^2-2x^2+11x-12}{x^2-2x^2+11x-12} = \frac{x-1}{x^2-14x+12}$

ب) $\frac{x+2}{x^2-2x^2+11x-12}$
 $DP: R - \{-\frac{1}{2}, 2, -1\}$

$\frac{x^2-2x^2+11x-12}{x^2-2x^2+11x-12} = \frac{x-1}{x^2-14x+12}$
 $\frac{x^2-2x^2+11x-12}{x^2-2x^2+11x-12} = \frac{x-1}{x^2-14x+12}$
 $\frac{x^2-2x^2+11x-12}{x^2-2x^2+11x-12} = \frac{x-1}{x^2-14x+12}$
 $\frac{x^2-2x^2+11x-12}{x^2-2x^2+11x-12} = \frac{x-1}{x^2-14x+12}$

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

$\begin{cases} x - \sqrt{x^2-2x} \neq 0 \rightarrow x^2 - 2x + x \neq 0 \\ \sqrt{x^2-2x} \geq 0 \rightarrow x^2 - 2x \geq 0 \rightarrow x(x-2) \geq 0 \end{cases}$
 $x = -2, y = -\frac{2}{-9}$

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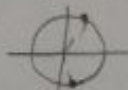
ب) $y = \frac{x+2}{x-\sqrt{x^2-2x}}$

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

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الف) $y = \frac{\sin x}{\cos x - 1}$

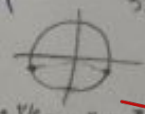
$\cos x - 1 \neq 0$
 $\cos x \neq \frac{1}{2}$



$DP: R - \{x | x = \frac{\pi}{3} + 2k\pi \text{ or } x = \frac{5\pi}{3} + 2k\pi\}$

ب) $y = \frac{\cos x}{\sin x + 1}$

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



$DP: R - \{x | x = \frac{3\pi}{2} + 2k\pi\}$

۱, ۷۵

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

$\begin{cases} \cos x \neq 0 \\ \cot x \neq 1 \end{cases}$



$DP: R - \{x | x = \frac{\pi}{2} + k\pi \text{ or } x = \frac{\pi}{4} + k\pi\}$

د) $y = \frac{\sin^2 x - 2}{\sin x + 2\sqrt{\frac{2}{3}}}$

$\sin^2 x \neq \frac{2}{3}$
 $\sin x \neq \pm \sqrt{\frac{2}{3}}$



$DP: R - \{x | x = \frac{\pi}{3} + 2k\pi \text{ or } x = \frac{2\pi}{3} + 2k\pi\}$

الف) $x^2 - 2x + 4 \geq 0$

$\frac{1}{+} \frac{2}{-} \frac{4}{+}$

$DP: (-\infty, 2) \cup (2, \infty)$

ب) $x^2 - 4x + 4 \leq 0$

$\frac{1}{+} \frac{4}{-} \frac{4}{+}$

$DP: [1, 2]$

ج) $x^2 + 4x + 4 \geq 0$

$\frac{-4}{+} \frac{4}{-} \frac{4}{+}$

$DP: (-\infty, -2] \cup [-2, \infty)$

د) $x^2 - 6x + 4 \leq 0$

$\frac{1}{+} \frac{6}{-} \frac{4}{+}$

$DP: [1, 4]$

۳

الف) $\frac{x^2 - 3x + 2}{x - 2} < 0$

$\frac{(x-1)(x-2)}{x-2} < 0$

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

$DP: (-\infty, 1) \cup (2, 2)$

ب) $\frac{x^2 - 1}{x^2 - 4x + 4} \geq 0$

$\frac{(x-1)(x+1)}{(x-1)(x-2)} \geq 0$

$DP: (-\infty, -1] \cup (2, \infty)$

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

$$\frac{(x-1)(x-3)}{x^2-1} \geq 0 \rightarrow \frac{1}{-1} \quad \frac{3}{+}$$

$$D_f = [1, 3)$$

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

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

$$D_f = \mathbb{R} - \{\pm 1\}$$

5

$$\text{ج) } y = \log(x^2 - 3x)$$

$$x^2 - 3x > 0 \rightarrow x(x-3) > 0$$

$$D_f = (-\infty, 0) \cup (3, \infty)$$

$$\text{د) } y = \log \sqrt{4-x^2}$$

$$4-x^2 > 0 \rightarrow x^2 < 4 \rightarrow -2 < x < 2$$

$$4-x^2 \geq 0 \rightarrow x^2 \leq 4 \rightarrow -2 \leq x \leq 2$$

$$4-x^2 > 0 \rightarrow x^2 < 4 \rightarrow -2 < x < 2$$

$$D_f = (-2, 2) \cup (2, 2) \cup \{2\}$$

$$\text{ه) } y = \log \frac{x^2 - 2x + 1}{x - 1}$$

$$\frac{(x-1)(x-1)}{x-1} \geq 0 \rightarrow \frac{1}{-1} \quad \frac{1}{+}$$

$$D_f = (-\infty, 1) \cup (1, \infty) \cup \{1\}$$

$$D_f = (-2, 1) \cup \{1\}$$

$$1-x > 0 \rightarrow x < 1$$

$$1-x \neq 0 \rightarrow x \neq 1$$

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

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

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

$$x^2 - x = x(x-1)$$

	-1	0	1	
$x^2 - x$	-	-	0	+
$x^2 + x$	-	0	+	+
$P(x)$	+	0	-	+

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

$$\frac{x - f(x)}{f(x)} \geq 0 \rightarrow x = f(x) \rightarrow x = 1, -1$$

$$f(x) = 0 \rightarrow x = 1, -1$$

$$x - f(x) \quad - \quad - \quad 0 \quad + \quad + \quad 0 \quad -$$

$$f(x) \quad + \quad + \quad - \quad - \quad + \quad + \quad -$$

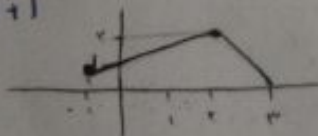
$$P(x) \quad - \quad - \quad + \quad + \quad - \quad - \quad +$$

$$D_f = (-1, -1] \cup (1, 1]$$

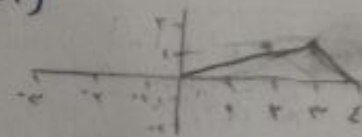
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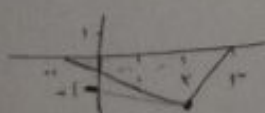
$$\text{الف) } f(x) + 1$$



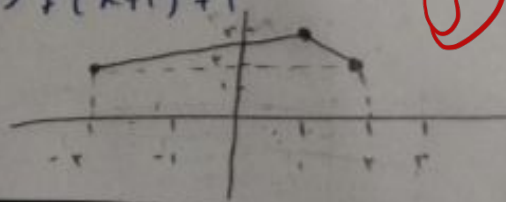
$$\text{ب) } f(x-1)$$



$$\text{ج) } -f(x)$$



$$\text{د) } f(x+1) + 1$$



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