

الف) $y = \frac{x+4}{4x^3 - 20x^2 + 21x - 14} \neq 0$

$$4x^3 - 20x^2 + 21x - 14 \neq 0$$

$$(x-1)(4x^2 - 16x + 14) \neq 0$$

$$(x-1)(2x-1)(2x-7) \neq 0$$

$$\textcircled{1} \leftarrow \frac{1}{x-1} \leftarrow \frac{1}{2x-1} \leftarrow \frac{1}{2x-7}$$

$$D_f = R - \left\{ \frac{1}{4}, \frac{1}{2}, \frac{7}{2} \right\} \quad \textcircled{1.5}$$

ب) $y = \frac{x+3}{3x^3 - x^2 - 11x - 6} \neq 0$

$$3x^3 - x^2 - 11x - 6 \neq 0$$

$$(x+1)(3x^2 - 4x - 6) \neq 0$$

$$\textcircled{1} \leftarrow \frac{1}{x+1} \leftarrow \frac{1}{3x-6}$$

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

الف) $y = \frac{x+1}{x - \sqrt{3-2x}} \neq 0$

$$\textcircled{1} \sqrt{3-2x} \rightarrow 3-2x \geq 0$$

$$2x \leq 3 \rightarrow x \leq \frac{3}{2}$$

$$\textcircled{2} x - \sqrt{3-2x} \neq 0$$

$$x \neq \sqrt{3-2x}$$

$$x^2 \neq 3-2x$$

$$\rightarrow x^2 \neq 3-2x \rightarrow x^2 + 2x - 3 \neq 0 \rightarrow (x+3)(x-1) \neq 0$$

$$\textcircled{1} \leftarrow \frac{1}{x+3} \leftarrow \frac{1}{x-1}$$

$$D_f = (-\infty, 1) \cup (1, 3) \cup (3, +\infty) - \{1\}$$

در ازا $x = -3$ تابع تعریف نشده و مشکلی ندارد پس زائد است.

ب) $y = \frac{x+2}{x - \sqrt{3x-2}} \neq 0$

$$\textcircled{1} 3x-2 \geq 0$$

$$3x \geq 2 \rightarrow x \geq \frac{2}{3}$$

$$\textcircled{2} x - \sqrt{3x-2} \neq 0$$

$$x \neq \sqrt{3x-2}$$

$$x^2 \neq 3x-2$$

$$\rightarrow x^2 \neq 3x-2 \rightarrow x^2 - 3x + 2 \neq 0 \rightarrow (x-1)(x-2) \neq 0$$

$$\textcircled{1} \leftarrow \frac{1}{x-1} \leftarrow \frac{1}{x-2}$$

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

الف) $y = \frac{\sin x}{r \cos x - 1} \neq 0$

$$r \cos x - 1 \neq 0$$

$$r \cos x \neq 1$$

$$\cos x \neq \frac{1}{r}$$

$$D_f = R - \left\{ 2k\pi \pm \frac{\pi}{r} \right\}$$



ب) $y = \frac{\cos x + 1}{r \sin x + 1} \neq 0$

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

$$r \sin x \neq -1$$

$$\sin x \neq -\frac{1}{r}$$

$$D_f = R - \left\{ 2k\pi + \frac{11\pi}{2}, 2k\pi + \frac{3\pi}{2} \right\}$$



ج) $y = \frac{\tan x + r}{\cot x - 1} \neq 0$

$$\cos x \neq 0$$

$$\sin x \neq 0$$

$$\cot x - 1 \neq 0$$

$$\cot x \neq 1$$



$$D_f = R - \left\{ \frac{k\pi}{r}, k\pi + \frac{\pi}{r} \right\}$$

د) $y = \frac{\sin x + 1}{r \sin^2 x - r} \neq 0$

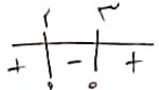
$$r \sin^2 x - r \neq 0$$

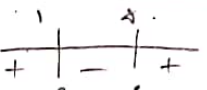
$$\sin^2 x \neq \frac{r}{r}$$

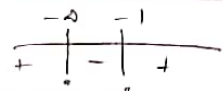
$$\sin x \neq \pm \frac{\sqrt{r}}{r}$$

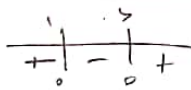
$$D_f = R - \left\{ k\pi \pm \frac{\pi}{r} \right\}$$

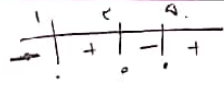


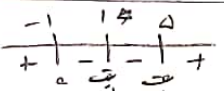
ا) $x^2 - 2x + 4 > 0$ $(x-2)(x-3) > 0$  $D_f = (-\infty, 2) \cup (3, +\infty)$ (2)

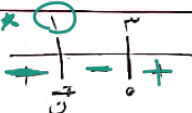
ب) $x^2 - 7x + 4 < 0$ $(x-1)(x-4) < 0$  $D_f = (1, 4)$

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

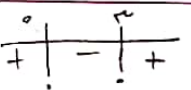
د) $x^2 - 7x + 4 \leq 0$ $(x-1)(x-4) \leq 0$  $D_f = [1, 4]$

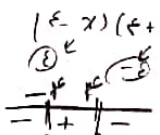
هـ) $\frac{x^2 - 5x + 4}{x - 1} < 0$ $\frac{(x-1)(x-4)}{(x-1)} < 0$  $D_f = (-\infty, -1) \cup (4, +\infty)$ (2)

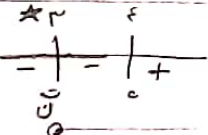
و) $\frac{x^2 - 1}{x^2 - 4x + 4} > 0$ $\frac{(x+1)(x-1)}{(x-1)(x-2)} > 0$  $D_f = (-\infty, -1] \cup (2, +\infty)$

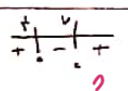
ز) $y = \sqrt{\frac{x^2 - 4x + 4}{x^2 - 1}}$ $\frac{(x-1)(x-2)}{(x-1)(x^2 + 1 + x)} \geq 0$  $D_f = [2, +\infty)$ (1, 8)

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

ط) $y = \log_{10} \frac{x^2 - 2x}{x(x-3)}$ $\frac{x^2 - 2x}{x(x-3)} > 0$  $D_f = (-\infty, 0) \cup (3, +\infty)$

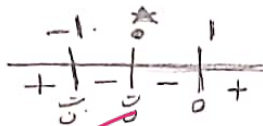
ي) $y = \log_{|x|-2} \frac{14 - x^2}{|x|-2}$ $\frac{14 - x^2}{|x|-2} > 0$ $(4-x)(4+x) > 0$  $D_f = (-4, -2) \cup (2, 4) - \{-2, 2\}$

ك) $y = \log_{10-x} \frac{x^2 - 7x + 12}{x-2}$ $\frac{x^2 - 7x + 12}{x-2} > 0$ $\frac{(x-3)(x-4)}{x-2} > 0$  $D_f = (3, 4) - \{3\}$

ل) $y = \sqrt{x^2 - 11x + 28} + \log_{10} \sqrt{34 - x^2}$ $(x-5)(x-6) \geq 0$  $D_f = (0, 5] \cup [6, +\infty)$ (1, 6)

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

① سیم: $\frac{x(x-1)}{x(x+1)}$



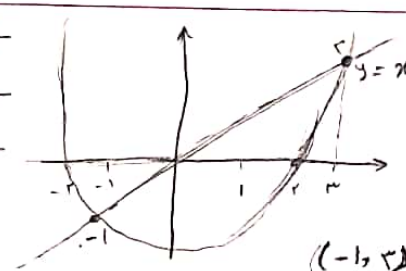
② $\omega, \bar{\omega}$:

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

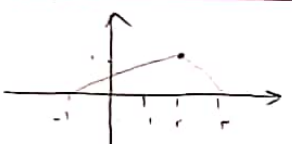
$$y = \sqrt{\frac{x - f(x)}{f(x)}}$$

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

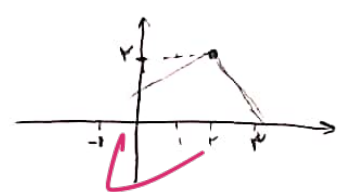
	-2	-1	2	3	
$x - f(x)$	-	-	+	+	-
$f(x)$	+	-	+	+	+
	-	+	-	+	-



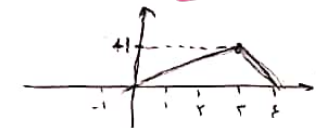
$$D_f = (-2, -1] \cup (2, 3]$$



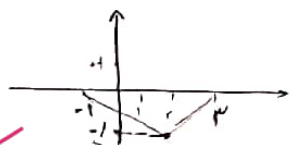
ا) $f(x) + 1 \Rightarrow$



ب) $f(x-1) \Rightarrow$



2) $-f(x) \Rightarrow$



3) $f(x+1) + 2 \Rightarrow$

