

$$x = \begin{cases} 3y-1 & y \geq 0 \rightarrow y \geq 0 \rightarrow 3y \geq 0 \rightarrow 3y-1 \geq -1 \rightarrow x \geq -1 \\ -y^2 & y < 0 \rightarrow y < 0 \rightarrow y^2 > 0 \rightarrow -y^2 < -1 \rightarrow x < -1 \end{cases}$$

$$y = \begin{cases} \frac{x+1}{3} & x \geq -1 \\ \sqrt{-x} & x < -1 \end{cases}$$

طبق شکل تابع است

① $y = \frac{x+1}{3} \rightarrow x = 3y-1 \rightarrow 3y = x+1 \rightarrow y = \frac{x+1}{3}$

② $\sqrt{-x} = y \rightarrow x = -y^2 \rightarrow -x = y^2 \rightarrow y = \pm \sqrt{-x}$ و چون $y < 0$ است

$$g(x) = \sqrt{\frac{x f(x-2)}{f(x)}} \rightarrow \frac{x f(x-2)}{f(x)} \geq 0 \quad \forall x \in \mathbb{R}$$

$\hookrightarrow \omega, \omega, -\varepsilon$

$$D_g = (-\varepsilon, -2] \cup [0, 2) \cup [4, +\infty)$$

min $f(x)$ و $f(x)$ در $x = \varepsilon$ و $x = 4$

	$-\varepsilon$	-2	0	2	4	$+$
$f(x-2)$	$-$	0	$+$	$+$	0	$+$
$f(x)$	$-$	0	$+$	$+$	0	$+$
x	$-$	$-$	0	$+$	$+$	$+$
$\frac{x f(x-2)}{f(x)}$	$-$	0	$+$	$+$	0	$+$

$$f(x) = \frac{5x^2 - 3x + 2}{x^3 - \varepsilon x}$$

$D_f = ? \rightarrow x^3 - \varepsilon x \neq 0 \rightarrow x(x^2 - \varepsilon) \neq 0 \rightarrow x \neq 0, \pm \sqrt{\varepsilon} \rightarrow D_f = \mathbb{R} - \{0, \pm \sqrt{\varepsilon}\}$

همواره مثبت و منفی

$$\sqrt{f(x)} = \sqrt{\frac{5x^2 - 3x + 2}{x^3 - \varepsilon x}} \rightarrow \frac{5x^2 - 3x + 2}{x^3 - \varepsilon x} \geq 0 \quad \Delta = -1, \alpha > 0 \rightarrow$$

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

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

$\hookrightarrow t^2 - 2t - 1 = 0 \rightarrow (t-1)(t+2) = 0 \rightarrow t^2 = \varepsilon \rightarrow x = \pm \sqrt{\varepsilon}$

ب) $y = \frac{2x^2+1}{\varepsilon-2[-x]} \rightarrow \varepsilon-2[-x] \neq 0 \rightarrow \varepsilon \neq 2[-x] \rightarrow [-x] \neq \frac{\varepsilon}{2} \rightarrow -2 \leq -x < 2 \rightarrow -2 \geq x > -2$

$$D_f = \mathbb{R} - [-2, 2]$$

الف) $x(x^2-1) \geq 0 \rightarrow \frac{-1 \quad 0 \quad 1}{-1 \quad + \quad -1} \rightarrow (0, +\infty) \cup (-1, 0) \cup (1, +\infty)$

ب) $|x|-1 \neq 0 \rightarrow |x| \neq 1 \rightarrow x \neq \pm 1$

$|x-2|-x^2 \geq 0 \rightarrow \begin{cases} x > 2: x-2-x^2 \geq 0 \rightarrow \Delta < 0, \alpha < 0 \rightarrow \text{همواره منفی} \\ x < 2: -x+2-x^2 \geq 0 \rightarrow x = 1, -2 \end{cases}$

$\frac{-2}{-1+1-1} \rightarrow [-2, 1]$

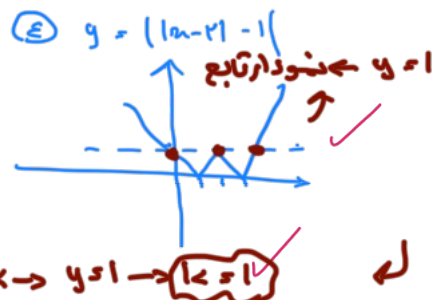
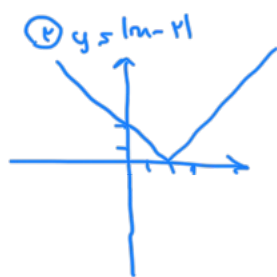
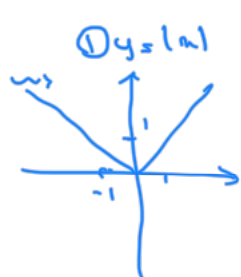
① ② $\rightarrow [-2, 1) - \{-1\} = D_f$

الف) $y = \sqrt{(n+1)[n-2]} \rightarrow (n+1)[n-2] \geq 0$
 $\rightarrow \frac{+}{-} \frac{+}{0} \frac{+}{+} \rightarrow D_f = (-\infty, -2) \cup [3, +\infty)$ ✓

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ب) $y = \sqrt{|n-1|[n-3]} \rightarrow |n-1|[n-3] \geq 0$
 $\rightarrow \frac{+}{-} \frac{+}{-} \frac{+}{0} \frac{+}{+} \rightarrow D_f = (-\infty, -3) \cup \{1\}$ ✓

$y = \frac{1}{|n-1|-1} \rightarrow |n-1|-1 \neq 0 \rightarrow |n-1| \neq 1$



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$f(n) = \frac{n^2 + 2n + 2}{n^2 + 2n + 1} \rightarrow \frac{n+1}{n-1} \neq 0, n-1 \neq 0 \rightarrow n \neq 1$ ① و $\frac{n^2 + 2n + 2}{n^2 + 2n + 1} \rightarrow$

$n^2 + 2n + 1 \neq 0 \rightarrow (n+1)(n+1) \neq 0$
 $n \neq -1$ ② $\rightarrow$ ① و ② $\rightarrow D_f = \mathbb{R} - \{-1, 1\} \rightarrow n \neq -1$ ③
 $\rightarrow n^2 - 4n + 9 \geq 0 \rightarrow (n-2)^2 \geq -5 \rightarrow n \in \mathbb{R}$ ✓

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$y = \log_{n+1} \log_n \frac{1}{n} \rightarrow n+1 \neq 1 \rightarrow n \neq 0$
 $n+1 > 0 \rightarrow n > -1$

$\log_n \frac{1}{n} \rightarrow n > 0$



$\log_n \frac{1}{n} > 0 \rightarrow$ پس باید n بین صفر تا یک باشد
 جواب مثبت شود $y > 0, n > 1$



$\rightarrow 0 < n < 1$ ✓

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$f(n) \rightarrow D_{f(n)} = [-2, 3]$

$-2 \leq \sqrt{n^2-1} \leq 3 \rightarrow -2 \leq n^2-1 \leq 3 \rightarrow -1 \leq n^2 \leq 4 \rightarrow n^2 \leq 4$
 $\rightarrow -\frac{2}{\sqrt{3}} \leq n \leq \frac{2}{\sqrt{3}} \rightarrow -\frac{2\sqrt{3}}{3} \leq n \leq \frac{2\sqrt{3}}{3}$

$\rightarrow D_{f(n^2-1)} = \left[-\frac{2\sqrt{3}}{3}, \frac{2\sqrt{3}}{3}\right]$ ✓

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