

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

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

طبق شکل است

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

$$\textcircled{2} \sqrt{-a} = y \rightarrow a = -y^2 \rightarrow -a = y^2 \rightarrow y = \pm \sqrt{-a}$$

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

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

$$D_g = (-\varepsilon, -r] \cup [0, r) \cup [v, +\infty)$$

	$-\varepsilon$	$-r$	0	r	ω	v
$f(x-r)$	-	-	+	+	+	+
$f(x)$	-	+	+	+	+	+
x	-	-	-	+	+	+
$\frac{x f(x-r)}{f(x)}$	-	+	+	+	+	+

min $f(x)$ و $f(x-r)$ در $x = \varepsilon$ و $x = r$

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

$$D_f = ? \rightarrow rx^2 - \varepsilon x \neq 0 \rightarrow x(x^2 - \frac{\varepsilon}{r}) \neq 0 \rightarrow x \neq 0 \rightarrow D_f = \mathbb{R} - \{-r, 0, r\}$$

$$\sqrt{f(x)} = \sqrt{\frac{rx^2 - 3x + 2}{x^3 - \varepsilon x}} \rightarrow \frac{rx^2 - 3x + 2}{x^3 - \varepsilon x} \geq 0 \quad \Delta = -v, a > 0 \rightarrow \text{همواره مثبت}$$

$\hookrightarrow$ مخرج $\neq 0$

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

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

$\hookrightarrow t^2 - 2t - 1 = 0 \rightarrow (t-1)(t+2) = 0 \rightarrow t^2 = 1 \rightarrow t = \pm 1$

$$y = \frac{rx^2 + 1}{\varepsilon - x^2} \rightarrow \varepsilon - x^2 \neq 0 \rightarrow \varepsilon \neq x^2 \rightarrow x^2 < \varepsilon \rightarrow -\sqrt{\varepsilon} < x < \sqrt{\varepsilon}$$

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

$$x(x^2 - 1) \geq 0 \rightarrow \frac{-1}{-1+1-1}, |x| + x > 0 \rightarrow (0, +\infty) \cup [-1, 0] \cup [1, +\infty)$$

$\hookrightarrow [1, +\infty) = D_f$

$$\textcircled{1} |x| - 1 \neq 0 \rightarrow |x| \neq 1 \rightarrow x \neq \pm 1$$

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

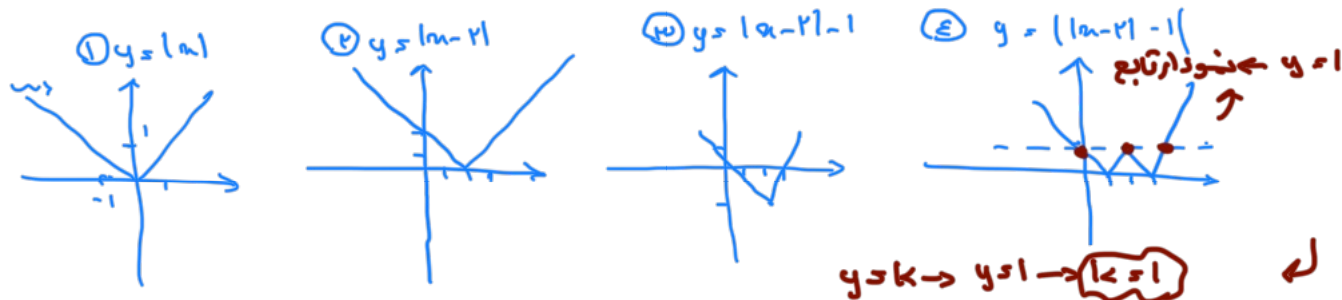
$\frac{-1}{-1+1-1} \rightarrow [-1, 1]$

$$\textcircled{1} \cap \textcircled{2} \rightarrow [-1, 1] - \{-1, 1\} = D_f$$

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

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

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



$f(n) = \frac{n^2 + 3n + 2}{n^2 + 2n + 1} \rightarrow \frac{n+1}{n-1} \neq 0, n-1 \neq 0 \rightarrow n \neq 1$ ① و $\frac{n^2 + 3n + 2}{n^2 + 2n + 1} \rightarrow$
 $\frac{n+1}{n-1} \rightarrow n \neq -1$ ②
 $n^2 + 2n + 1 \neq 0 \rightarrow (n+1)(n+1) \neq 0$
 $n \neq -1$ ③ $\rightarrow$ ① ② ③ $\rightarrow D_f = \mathbb{R} - \{-1, 1\} \rightarrow n \neq 1 \rightarrow n^2 - 2n + 1 \neq 0$
 $\rightarrow n^2 - 4n + 4 \geq 0 \rightarrow (n-2)^2 \geq 0 \rightarrow n \neq 2$
 $\rightarrow$ اتحاد سه، دو، یک

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



$f(n) \neq 0, D_{f(n)} = [-2, 3]$

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

$\rightarrow D_{f(n^2-1)} = \left[-\frac{\sqrt{4}}{2}, \frac{\sqrt{4}}{2} \right]$