

$$f(x) = \begin{cases} 3x-1 & x \geq 0 \\ -x^2 & x > 1 \end{cases} \xrightarrow{\text{if}} x=2 \rightarrow x \geq 0: 3(2)-1=5=f(x) \\ \rightarrow x > 1: -(2^2) = -4 = f(x)$$

به ازای یک x تا x داریم تابع شیب

x	$[-5, -4)$	$(-4, 3)$	$(3, 4)$	$(4, 5)$
$f(x)$	-	+	-	-

in $g(x)$ $x \in D_f, x-2 \in D_f, f(x) \neq 0, \frac{x f(x-2)}{f(x)} \geq 0$

$x-2 > -5 \Rightarrow x > -3$ $x \neq 3, 5$
 $x-2 = 4 \Rightarrow x \neq 6$ $f(4) \neq 0 \Rightarrow x \neq 4$

$D_g = [-3, -1] \cup [3, 5] \cup [6, +\infty)$

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

$D_f = \mathbb{R} - \{-2, 0, 2\}$ (الف)

$\frac{2x^2 - 3x + 2}{x^3 - 4x} \geq 0$ Δ $\rightarrow$ $\frac{2x^2 - 3x + 2}{x^3 - 4x} \geq 0$

$x(x-2)(x+2) > 0$ $\frac{-2}{+} \frac{0}{+} \frac{2}{-}$ $\Rightarrow D_f = (-2, 0) \cup (2, +\infty)$

$\frac{x-2}{x^3 - 2x^2 - 1} \geq 0$ (الف)

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

$x+2 > 0$ $x \neq 2$ $D_f = (-\infty, -2) \cup (2, +\infty)$

(ب) $4-2[-x] \neq 0$
 $\Rightarrow [-x] \neq 2$
 $[-x] = 2 \Rightarrow -3 < x \leq -2$
 $\Rightarrow D_f = \mathbb{R} - (-3, -2]$

$x(x^2 - 1) \geq 0 \Rightarrow x(x-1)(x+1) \geq 0$ (الف)

$\frac{-1}{+} \frac{0}{+} \frac{1}{-}$ $\rightarrow x \in [-1, 0] \cup [1, +\infty)$

$|x| + x > 0 \Rightarrow |x| > -x$ $\Rightarrow D = (0, +\infty)$

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

(ب) $|x-2| - x^2 \geq 0$ $\xrightarrow{\text{if } x < 2}$ $2-x-x^2 \geq 0$
 $\Rightarrow x^2 + x - 2 \leq 0$ $\Rightarrow (x+2)(x-1) \leq 0$ $\Rightarrow -2 \leq x \leq 1$
 if $x > 2$ $x-2-x^2 \geq 0 \rightarrow$ بی جواب
 if $x = 2$ $|x|-1 \neq 0 \Rightarrow |x| = 1$
 $\Rightarrow x \neq 1, -1$

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

$(n-2)[n-2] \geq 0 \xrightarrow{\text{if } n < 2} \text{ (ف) } [n-2] \leq -1$ عبارت = 0 $n=1$ $n \neq 1 \rightarrow n-1 > 0 \Rightarrow [n-2] \geq 0$ $\Rightarrow n-2 \geq 0 \Rightarrow n \geq 2$ $D_f = [2, +\infty) \cup \{1\}$	$(n-2)[n-2] \geq 0 \xrightarrow{\text{if } n < 2} \text{ (ف) } [n-2] \leq -1$ عبارت = 0 $n=1$ $n \neq 1 \rightarrow n-1 > 0 \Rightarrow [n-2] \geq 0$ $\Rightarrow n-2 \geq 0 \Rightarrow n \geq 2$ $D_f = [2, +\infty) \cup \{1\}$
$\ n-2 -1-k=0 \Rightarrow \ n-2 -1\ =k$ if $k=1$ $\ n-2 -1\ =1 \Rightarrow n-2 -1=1 \text{ or } n-2 -1=-1$ $n-2 =2 \Rightarrow n=0, 4$ $n-2 =0 \Rightarrow n=2$ $k=1$	$\ n-2 -1-k=0 \Rightarrow \ n-2 -1\ =k$ if $k=1$ $\ n-2 -1\ =1 \Rightarrow n-2 -1=1 \text{ or } n-2 -1=-1$ $n-2 =2 \Rightarrow n=0, 4$ $n-2 =0 \Rightarrow n=2$ $k=1$
$n^2+3n+2 \neq 0 \Rightarrow (n+1)(n+2) \neq 0 \Rightarrow n \neq -1, -2$ $n-1 \neq 0 \Rightarrow n \neq 1, \frac{n+1}{n-1} \neq 0 \Rightarrow n+1 \neq 0 \Rightarrow n \neq -1$ اعداد صحیح $\rightarrow -1, -2, 1 \Rightarrow n=2$ $n^2-9n+9=0 \Rightarrow (n-3)^2=0 \rightarrow n=3$	$n^2+3n+2 \neq 0 \Rightarrow (n+1)(n+2) \neq 0 \Rightarrow n \neq -1, -2$ $n-1 \neq 0 \Rightarrow n \neq 1, \frac{n+1}{n-1} \neq 0 \Rightarrow n+1 \neq 0 \Rightarrow n \neq -1$ اعداد صحیح $\rightarrow -1, -2, 1 \Rightarrow n=2$ $n^2-9n+9=0 \Rightarrow (n-3)^2=0 \rightarrow n=3$
$n > 0, n \neq 1, \log_{\frac{1}{n}} > 0$ if $0 < n < 1 \rightarrow$ داخل: $0 < n < 1$ خارج: $n+1 > 0 \Rightarrow n+1 \neq 1$ $0 < n < 1 \checkmark$ $D_f = (0, 1)$	$n > 0, n \neq 1, \log_{\frac{1}{n}} > 0$ if $0 < n < 1 \rightarrow$ داخل: $0 < n < 1$ خارج: $n+1 > 0 \Rightarrow n+1 \neq 1$ $0 < n < 1 \checkmark$ $D_f = (0, 1)$
$-9 \leq (3n^2-1) \leq 3 \rightarrow -9 \leq 3n^2-1 \Rightarrow -8 \leq 3n^2 \checkmark$ $3n^2-1 \leq 3 \Rightarrow n^2 \leq \frac{4}{3}$ $\Rightarrow -\frac{2}{\sqrt{3}} \leq n \leq \frac{2}{\sqrt{3}}$ $\Rightarrow D_{f(3n^2-1)} = \left[-\frac{2}{\sqrt{3}}, \frac{2}{\sqrt{3}}\right]$	$-9 \leq (3n^2-1) \leq 3 \rightarrow -9 \leq 3n^2-1 \Rightarrow -8 \leq 3n^2 \checkmark$ $3n^2-1 \leq 3 \Rightarrow n^2 \leq \frac{4}{3}$ $\Rightarrow -\frac{2}{\sqrt{3}} \leq n \leq \frac{2}{\sqrt{3}}$ $\Rightarrow D_{f(3n^2-1)} = \left[-\frac{2}{\sqrt{3}}, \frac{2}{\sqrt{3}}\right]$