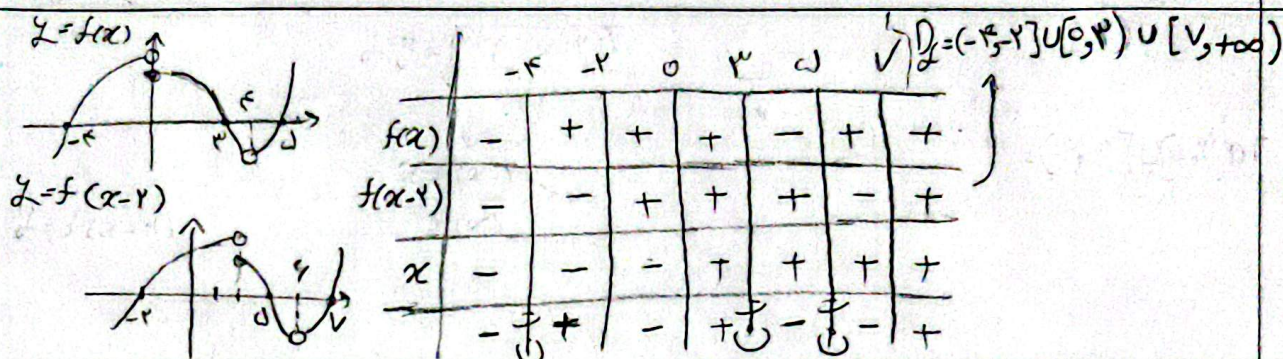


$$x = y^3 - 1 \rightarrow y = \sqrt[3]{x+1} \xrightarrow{x \geq 0} \sqrt[3]{x+1} \geq 0 \rightarrow \boxed{x \geq -1}$$

$$x = -y^3 \rightarrow y^3 = -x \xrightarrow{x \geq 1} y = \sqrt[3]{-x} \xrightarrow{y \geq 1} \sqrt[3]{-x} \geq 1 \rightarrow -x \geq 1 \rightarrow \boxed{x \leq -1}$$

$$y = \begin{cases} \sqrt{-x} & ; x \leq -1 \\ \sqrt[3]{x+1} & ; x \geq -1 \end{cases} \rightarrow \text{رابطه مورد نظر تابع است.} \rightarrow \text{بالوجه به توابع به دست آمده، می بینیم در هیچ نقطه ای به ازای یک x، دو y نداریم}$$



$f(x) = \frac{2x^2 - 3x + 2}{x^3 - 4x}$

الف) $x^3 - 4x = x(x-2)(x+2) \neq 0$

ب) $\Delta < 0 \rightarrow$ همواره مثبت است $\rightarrow \frac{2x^2 - 3x + 2}{x^3 - 4x} \geq 0$

$\hookrightarrow x(x-2)(x+2) \geq 0$

$\hookrightarrow D_f = \mathbb{R} - \{-2, 0, 2\}$

Sign chart for $x(x-2)(x+2)$:

x	-2	0	2
x	-	+	+
$x-2$	-	-	+
$x+2$	+	+	+
Product	-	+	+

$\hookrightarrow D_f = (-2, 0) \cup (2, +\infty)$

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

ب) $y = \frac{2x^2 + 1}{4 - 2[-x]} \quad [-x] \neq 2$

$4 - 2[-x] \neq 0 \rightarrow 4 \neq 2[-x] \rightarrow \boxed{D_f = \mathbb{R} - (-2, -4]}$

Sign chart for $\frac{x+2}{x^2 - 2x^3 - 1}$:

x	-2	2
x	-	+
$x+2$	+	+
Product	-	+

$\hookrightarrow D_f = (-2, 2) \cup (2, +\infty)$

$y = \sqrt{x(x-1)(x+1)} \rightarrow \frac{x}{y} \rightarrow \frac{0}{1} \rightarrow \frac{1}{1} \rightarrow \frac{1}{1}$

$\sqrt{|x|+x} \quad [-1, 0] \cup [1, +\infty)$

$x \geq 0 \rightarrow \boxed{D_f = [1, +\infty)}$

ب) $y = \sqrt{|x-2| - x^2}$

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

همواره منفی است و پاسخی ندارد.

$x \geq 2 \rightarrow -x^2 + x - 2 \geq 0$

$x < 2 \rightarrow -x^2 - x + 2 \geq 0$

$(x+2)(x-1) \leq 0$

$\hookrightarrow -2 \leq x \leq 1$

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

$$الف) y = \sqrt{(x-2)(x-2)}$$

$$\frac{x}{2} \quad \frac{2}{1} \quad \frac{2}{1} \quad +$$

$$\hookrightarrow D_f = \mathbb{R}$$

$$ب) y = \sqrt{|x-1|(x-3)}$$

$$\frac{x}{2} \quad \frac{1}{-1} \quad \frac{3}{0} \quad \frac{3}{1} \quad +$$

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

$$||x-2|-1| - k \neq 0$$

$$||x-2|-1| \neq k$$

$$k=1 \rightarrow ||x-2|-1| = 1 \rightarrow \begin{cases} |x-2|-1=1 \rightarrow |x-2|=2 \rightarrow \boxed{x=0}, \boxed{x=4} \\ |x-2|-1=-1 \rightarrow |x-2|=0 \rightarrow \boxed{x=2} \end{cases}$$

$\boxed{k=1}$

$$f(x) = \frac{x^2+3x+2}{x^2+3x+2} \cdot \frac{x+1}{x-1}$$

$$\frac{x+1}{x-1} \rightarrow \boxed{x \neq -1}, \boxed{x \neq 1}$$

$$\begin{aligned} x^2+3x+2 &\neq 0 \\ (x+1)(x+2) &\neq 0 \\ \hookrightarrow x &\neq \{-1, -2\} \end{aligned}$$

$$x \neq \{-2, -1, 1\}$$

$$\boxed{n=3}$$

$$\rightarrow x^2-9x+9=0$$

$$(x-3)^2=0$$

$\Delta=0 \rightarrow$ یک ریشه دارد.

$$y = \log_{x+1} \log_x \frac{1}{x}$$

$$\rightarrow \log_x \frac{1}{x} > 0 \rightarrow 0 < \frac{1}{x} < 1$$

$$\hookrightarrow \boxed{x > 0}, \boxed{x \neq 1}$$

$$\begin{aligned} x+1 &> 0 \rightarrow \boxed{x > -1} \\ x &\neq 0 \end{aligned}$$

$$\log_x \frac{1}{x} > 0 \rightarrow \boxed{0 < x < 1}$$

$$\boxed{D_f = (0, 1)}$$

$$D_f(x) = [-1, 3]$$

$$\rightarrow -1 \leq 3x^2-1 \leq 3 \rightarrow -4 \leq 3x^2 \leq 4$$

$$D_f(3x^2-1) = ?$$

$$\rightarrow -\frac{4}{3} \leq x^2 \leq \frac{4}{3} \xrightarrow{x^2 \geq 0} x^2 \leq \frac{4}{3}$$

$$\hookrightarrow \boxed{\left[-\frac{2\sqrt{3}}{3}, \frac{2\sqrt{3}}{3}\right]}$$

$$\rightarrow |x| \leq \frac{2}{\sqrt{3}} \rightarrow \boxed{-\frac{2}{\sqrt{3}} \leq x \leq \frac{2}{\sqrt{3}}}$$