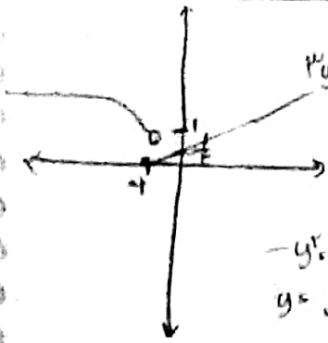




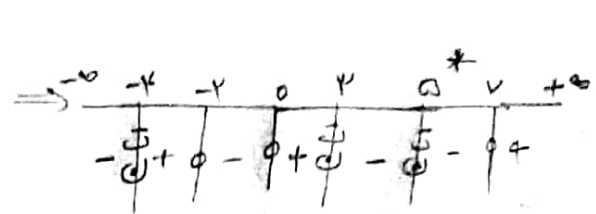
$$y_0 = 1 \leq x_1 \quad y_0 = \frac{x_1}{x_1^2} + \frac{1}{x_1^2} \Rightarrow \frac{x_1}{x_1^2} + \frac{1}{x_1^2} \geq 0 \rightarrow x_1 \geq -1$$

تابع مثبت

$$-y_0 = x_1 \quad y = \sqrt{-x_1} \xrightarrow{y > 1} \sqrt{-x_1} > 1 \quad \text{مثبت} \rightarrow -x_1 < 1 \quad x_1 < -1$$

$$\frac{x_1 f(x_1 - 1)}{f(x_1)} \geq 0$$

$$\begin{cases} x_1 \neq 0 \\ f(x_1 - 1) = 0 \rightarrow \begin{cases} x_1 = -1 \\ x_1 = 0 \\ x_1 = 1 \end{cases} \\ f(x_1) = 0 \rightarrow \begin{cases} x_1 = -1 \\ x_1 = 0 \\ x_1 = 1 \end{cases} \end{cases}$$



$$D_f = (-1, -1/2] \cup [0, 1/2) \cup [2, +\infty)$$

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الف) $x_1^3 - 4x_1 \neq 0$
 $x_1(x_1^2 - 4) \neq 0 \Rightarrow D_f = \mathbb{R} - \{0, \pm 2\}$
 $x_1 \neq 0, \pm 2$

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ب) $\sqrt{\frac{2x_1^3 - 3x_1 + 1}{x_1^3 - 4x_1}} \geq 0 \Rightarrow \frac{2x_1^3 - 3x_1 + 1}{x_1^3 - 4x_1} \geq 0$
 $\frac{2x_1^3 - 3x_1 + 1}{x_1(x_1 - 1)(x_1 + 1)} \geq 0$
 Number line: $-\infty, -1, 0, 1, +\infty$
 Signs: $- \oplus + \oplus - \oplus +$
 $\Rightarrow D_f = (-1, 0) \cup (1, +\infty)$

ج) $\frac{x_1 - 2}{x_1^3 - 4x_1 - 1} \geq 0 \Rightarrow \frac{x_1 - 2}{x_1^3 - 4x_1 - 1} \geq 0$
 $\frac{(x_1 - 2)(x_1^2 + 2)}{(x_1 - 2)(x_1 + 1)}$
 Number line: $-\infty, -1, 2, +\infty$
 Signs: $- \oplus + \oplus +$
 $\Rightarrow D_f = (-1, +\infty) - \{2\}$

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د) $4 - 2[-x_1] \neq 0 \Rightarrow [-9, 2] \neq 2 \Rightarrow -x_1 \neq [2, 3] \Rightarrow D_f = \mathbb{R} - [-3, -2]$
 $x_1 \neq [-3, -2]$

ه) $x_1(x_1 - 1)(x_1 + 1) \geq 0 \Rightarrow \frac{x_1(x_1 - 1)(x_1 + 1)}{x_1(x_1 - 1)(x_1 + 1)} \geq 0$
 $|x_1| + x_1 \neq 0 \rightarrow x_1 \neq (-\infty, 0]$
 Number line: $-\infty, -1, 0, 1, +\infty$
 Signs: $- \oplus + \oplus +$
 $\Rightarrow [-1, 0] \cup [1, +\infty)$
 $\cap D_f = [-1, 0]$

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و) $|x_1 - 2| - x_1^2 \geq 0 \Rightarrow \frac{|x_1 - 2| - x_1^2}{|x_1 - 2| - x_1^2} \geq 0$
 $\begin{cases} x_1 - 2 = -x_1^2 \rightarrow x_1 = -1 \\ x_1 - 2 = x_1^2 \rightarrow \Delta < 0 \end{cases}$
 Number line: $-\infty, -1, 2, +\infty$
 Signs: $- \oplus + \oplus +$
 $|x_1| \neq 1 \Rightarrow D_f = [-1, +\infty) - \{\pm 1\}$
 $x_1 \neq \pm 1$

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$(x-2)(x-3) \geq 0$
 $\Rightarrow D_f = \mathbb{R}$

$\rightarrow |x-1|(x-3) \geq 0$
 $\Rightarrow [1, +\infty) = D_f$

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$||x-2|-1| - K \leq 0 \rightarrow ||x-2|-1| = K \rightarrow K \geq 0$

$K \leq 0 \rightarrow |x-2|=1 \rightarrow \begin{cases} x-2=1 \rightarrow x=3 \\ x-2=-1 \rightarrow x=1 \end{cases} \Rightarrow K \leq 0, 1, 2$

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

* با دادن اعداد بکری به K مانند
 3 و 4 و ... مقادیر x بکری
 می شود

$K=2 \rightarrow |x-2|-1=2 \rightarrow \begin{cases} x-2=3 \rightarrow x=5 \\ x-2=-3 \rightarrow x=-1 \end{cases}$
 $|x-2|-1=-2 \rightarrow |x-2|=-1$ غلط

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$x^2+3x+2 \neq 0 \quad a+c \neq b$
 $\left. \begin{aligned} x \neq -1 \\ x \neq -2 \end{aligned} \right\} n=3 \Rightarrow x^2-4x+9=0$
 $(x-3)^2=0 \rightarrow x=3$

7

$y = \log \frac{1}{x}$
 $\log \frac{1}{x} > 0 \rightarrow \frac{1}{x} > x^0 \rightarrow \frac{1}{x} > 1$ قه
 $\log \frac{1}{x} < 0 \rightarrow \frac{1}{x} < x^0 \rightarrow \frac{1}{x} < 1$ قه
 $\begin{cases} x+1 > 0 \rightarrow x > -1 \\ x+1 \neq 0 \rightarrow x \neq -1 \end{cases}$
 $\Rightarrow D_f = (0, 1)$

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$f(x, y) = \frac{1}{\sqrt{1-x^2-y^2}}$
 $[-K, K] \xrightarrow{\frac{1}{\sqrt{1-x^2-y^2}}} [-\frac{K}{\sqrt{1-x^2-y^2}}, \frac{K}{\sqrt{1-x^2-y^2}}] \xrightarrow{\text{جزر}} [0, \frac{1}{\sqrt{1-x^2-y^2}}]$