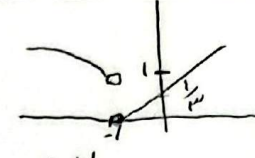


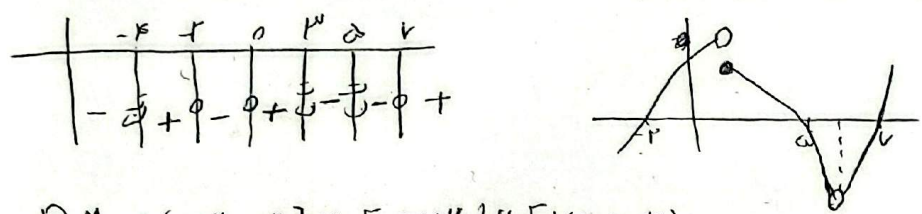
$$x = \begin{cases} 3y-1 & y \geq 0 \rightarrow 3y \geq 0 \rightarrow 3y-1 \geq -1 \rightarrow x \geq -1 \\ -y^2 & y > 1 \rightarrow y^2 > 1 \rightarrow -y^2 < -1 \rightarrow x < -1 \end{cases}$$

$y = \begin{cases} \frac{x+1}{3} & x \geq -1 \\ \sqrt{-x} & x < -1 \end{cases}$
 $x = 3y-1 \quad 3y = x+1 \quad y = \frac{x+1}{3}$
 $x = -y^2 \quad y^2 = -x \quad y = \pm \sqrt{-x} \rightarrow y = \sqrt{-x}$
 غلط ← چون $y > 1$ طبق شکل تابع است ✓



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$$g(x) = \sqrt{\frac{x f(x-2)}{f(x)}} \rightarrow \frac{x f(x-2)}{f(x)} \geq 0 \quad \begin{aligned} f(x) &\geq 0 \text{ و } f(x-2) < 0 \rightarrow x < 0 \\ f(x) &< 0 \text{ و } f(x-2) \geq 0 \rightarrow x > 2 \end{aligned}$$



$$Dg = (-2, 0] \cup [0, 2) \cup (2, +\infty)$$

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الف) $x^3 - 4x \neq 0 \quad x(x-2)(x+2) \neq 0 \quad Df = \mathbb{R} - \{0, 2, -2\}$

ب) $g(x) = \sqrt{f(x)} \quad f(x) \geq 0 \quad \frac{x^2 - 4x + 4}{x(x-2)(x+2)} \geq 0 \quad \begin{aligned} \Delta < 0 &\rightarrow x < 0 \\ \Delta > 0 &\rightarrow x > 0 \end{aligned}$

$\begin{array}{c|ccc} -2 & 0 & 2 & \\ \hline - & + & - & + \end{array}$
 $Dg = (-2, 0) \cup (2, +\infty)$

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الف) $\frac{x-2}{(x+2)(x-2)(x^2+2)} \geq 0 \quad \begin{aligned} \Delta < 0 &\rightarrow x < 0 \\ \Delta > 0 &\rightarrow x > 0 \end{aligned}$

$\begin{array}{c|cc} -2 & 2 & \\ \hline - & + & + \end{array}$
 $Df = (-2, +\infty) - \{2\}$

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ب) $\frac{2x^2+1}{x^2-2[-x]} \neq 0 \quad [-x] \neq 2 \quad Df = \mathbb{R} - (-2, -1]$

$x^2 - 2[-x] \neq 0 \quad x^2 + 2x \neq 0 \quad x(x+2) \neq 0 \quad x \neq 0, -2$
 $[-x] \neq 2 \quad -x \neq 2 \quad x \neq -2$
 $-2 \geq x > -\infty$

$f(x) = \frac{\sqrt{x(x^2-1)}}{\sqrt{|x|+x}}$
 $x(x+1)(x-1) \geq 0$
 $|x|+x > 0 \rightarrow \begin{aligned} x < 0 &\rightarrow \text{الف} \\ x = 0 &\rightarrow \text{الف} \\ x > 0 &\rightarrow \text{ب} \end{aligned}$

$$(I) \cap (II) = Df = [1, +\infty)$$

$f(x) = \frac{\sqrt{|x-1|-x^2}}{|x|-1} \quad |x-1|=x^2 \quad \begin{aligned} -x^2+x-1 &\geq 0 \\ -x^2-x+1 &\geq 0 \\ x^2+x-1 &\geq 0 \end{aligned}$
 $|x| \neq 1 \quad x \neq \pm 1$

$Df = (-\infty, -1] \cup (1, +\infty)$

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$$a) y = \sqrt{(x-2)(x-4)} \rightarrow (x-2)(x-4) \geq 0 \quad \begin{array}{c} x \\ | \quad + \quad - \quad + \\ 2 \quad 4 \end{array}$$

$$Df = \mathbb{R}$$

$$b) y = \sqrt{|x-1|(x-3)} \quad |x-1|(x-3) \geq 0 \quad \begin{array}{c} x \\ | \quad - \quad + \quad - \quad + \\ 1 \quad 3 \end{array}$$

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

$$y = \frac{1}{|x-1|-1} - k \neq 0 \quad |x-1|-1 \neq k \quad |x-1|-1 = k \rightarrow |x-1| = k+1$$

$$x-1 = k+1 \rightarrow x = k+2$$

$$x-1 = -(k+1) \rightarrow x = -k$$

$$|x-1|-1 = -k \rightarrow |x-1| = 1-k$$

$$x-1 = 1-k \rightarrow x = 2-k$$

$$x-1 = -(1-k) \rightarrow x = k$$

$$x^2 + 3x + 2 \neq 0 \quad (x+1)(x+2) \neq 0 \quad x \neq -1$$

$$x \neq -2$$

$$x+1 \neq 0 \quad x \neq -1$$

$$x-1 \neq 0 \quad x \neq 1$$

$$Df = \mathbb{R} - \{-2, -1, 1\} \rightarrow n = 3$$

$$x^2 - 9x + 9 = 0 \rightarrow \Delta = 81 - 4(9) = 0 \rightarrow \text{one root}$$

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

$$\left. \begin{array}{l} x+1 > 0 \quad x > -1 \\ x+1 \neq 1 \quad x \neq 0 \\ x > 0, \quad x \neq 1 \end{array} \right\} Df = (0, +\infty) - \{1\}$$

$$Df(x) = [-\frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}}] \quad -\frac{1}{\sqrt{3}} \leq \sqrt{3}x^2 - 1 \leq \frac{1}{\sqrt{3}}$$

$$\sqrt{3}x^2 \leq \frac{1}{\sqrt{3}} \quad x^2 \leq \frac{1}{3} \quad -\frac{1}{\sqrt{3}} \leq x \leq \frac{1}{\sqrt{3}}$$

$$[-\frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}}]$$