

$$f(x) = \sqrt{(a-2)x^2 + ax + b} \Rightarrow \begin{cases} (a-2)x^2 + ax + b \geq 0 \xrightarrow{x=2} 4a - 11 + 2a + b \geq 0 \Rightarrow b \geq 11 - 4a \\ a-2 > 0 \Rightarrow a > 2 \end{cases}$$

$D_f = [2, \infty)$

$a=2 \Rightarrow b \leq 11 - 4(2) \Rightarrow b \leq -4$
 $b \in (-\infty, -4)$

$a=3 \Rightarrow b = 11 - 4(3) \Rightarrow b = -1$
 پس b با بزرگ شدن a کوچکتر می شود.

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$$f(x) = \sqrt{x^2 + 2x + 2 - m^2} \Rightarrow \begin{cases} x^2 + 2x + 2 - m^2 \geq 0 \\ \Delta \leq 0 \Rightarrow 4 - 4(2 - m^2) \leq 0 \Rightarrow 4m^2 - 4 \leq 0 \Rightarrow m^2 \leq 1 \Rightarrow -1 \leq m \leq 1 \\ a > 0 \end{cases}$$

$D_f = \mathbb{R}$

۱ - (-1) = 2

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$$f(x) = \frac{\sqrt{4-x^2}}{[x] + [x] + 1} \Rightarrow \begin{cases} 4-x^2 \geq 0 \Rightarrow x^2 \leq 4 \Rightarrow -2 \leq x \leq 2 \\ [x] + [-x] + 1 \neq 0 \Rightarrow [x] + [-x] \neq -1 \Rightarrow x \notin \mathbb{Z} \end{cases}$$

$D_f = [-2, 2] \Rightarrow D_f = \{-2, -1, 0, 1, 2\} \Rightarrow n = 5$

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$$y = \sqrt{x^2 + 3x^2} \Rightarrow x^2 + 3x^2 \geq 0 \Rightarrow x^2(1+3) \geq 0 \Rightarrow x^2 \geq 0 \Rightarrow x \in \mathbb{R}$$

$D_f = [-2, \infty)$

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$$y = \sqrt{\frac{(x^2-1)(x^2-3x^2)}{x^2-1}} \Rightarrow \begin{cases} (x^2-1)(x^2-3x^2) \geq 0 \Rightarrow x^2(x-1)(x+1)(x-3) \geq 0 \\ x^2-1 > 0 \Rightarrow (x-1)(x+1) > 0 \end{cases}$$

$D_f = (-\infty, -1] \cup \{0\} \cup [3, \infty)$

$$y = \sqrt{|x-2| - 3} \Rightarrow |x-2| - 3 \geq 0 \Rightarrow |x-2| \geq 3 \Rightarrow \begin{cases} x-2 \geq 3 \Rightarrow x \geq 5 \\ x-2 \leq -3 \Rightarrow x \leq -1 \end{cases}$$

$D_f = (-\infty, -1] \cup [5, \infty)$

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$$y = \sqrt{4 - |2-x|} \Rightarrow 4 - |2-x| \geq 0 \Rightarrow |2-x| \leq 4 \Rightarrow -4 \leq 2-x \leq 4 \Rightarrow \begin{cases} x-2 \geq -4 \Rightarrow x \geq -2 \\ x-2 \leq 4 \Rightarrow x \leq 6 \end{cases}$$

$D_f = [-2, 6]$

$$\text{مثال 1)} y = \sqrt{1-x|x|} \Rightarrow 1-x|x| \geq 0 \Rightarrow x|x| \leq 1$$

$$\text{Df: } (-\infty, 1]$$

$$\begin{aligned} \oplus &\rightarrow 1|1| = 1 \checkmark \rightarrow 1|1| \leq 1 \\ \ominus &\rightarrow -1|1| = -1 \checkmark \\ \odot &\rightarrow 0|0| = 0 \checkmark \end{aligned}$$

$$\text{مثال 2)} y = \frac{1}{\sqrt{2-|x-1|}} \Rightarrow 2-|x-1| > 0 \Rightarrow |x-1| < 2 \Rightarrow -2 < x-1 < 2 \Rightarrow -1 < x < 3$$

$$\text{Df: } (-1, 3)$$

$$\text{مثال 3)} y = \frac{\sin x - 1}{\cos x} \Rightarrow \cos x \neq 0 \Rightarrow x = \frac{\pi}{2}, \frac{3\pi}{2} \Rightarrow x \neq \frac{\pi}{2} + k\pi$$

$$\text{Df: } \mathbb{R} - \left\{ \frac{\pi}{2} + k\pi \mid k \in \mathbb{Z} \right\}$$

$$\text{مثال 4)} y = \frac{\cos x}{2\cos x - 1} \Rightarrow 2\cos x - 1 \neq 0 \Rightarrow \cos x \neq \frac{1}{2} \Rightarrow x \neq \frac{\pi}{3}, \frac{5\pi}{3} \Rightarrow x \neq 2k\pi \pm \frac{\pi}{3}$$

$$\text{Df: } \mathbb{R} - \left\{ 2k\pi \pm \frac{\pi}{3} \mid k \in \mathbb{Z} \right\}$$

$$\text{مثال 5)} y = \frac{x^3}{|x+1| - |x+3|} \Rightarrow |x+1| - |x+3| \neq 0 \Rightarrow |x+1| \neq |x+3| \xrightarrow{\text{رفع توان}} (x+1)^2 \neq (x+3)^2$$

$$\Rightarrow x^2 + 2x + 1 \neq x^2 + 6x + 9 \Rightarrow 2x + 1 \neq 6x + 9 \Rightarrow -4x \neq 8 \Rightarrow x \neq -2$$

$$\text{Df: } \mathbb{R} - \{-2\}$$

$$\text{مثال 6)} y = \sqrt{|x+1| - |x+3|} \Rightarrow |x+1| - |x+3| \geq 0 \Rightarrow |x+1| \geq |x+3| \xrightarrow{\text{رفع توان}} (x+1)^2 \geq (x+3)^2$$

$$\Rightarrow x^2 + 2x + 1 \geq x^2 + 6x + 9 \Rightarrow -4x \geq 8 \Rightarrow x \leq -2$$

$$\text{Df: } (-\infty, -2] \cup [2, \infty)$$

$$f(x) = \sqrt{\log_{10} \log_a^{(x-1)}} \Rightarrow \log_{10} \log_a^{(x-1)} \geq 0$$

$$\begin{cases} \log_a^{(x-1)} \geq 1 \Rightarrow x-1 \geq 1 \Rightarrow x \geq 2 \\ \log_a^{(x-1)} \leq 0 \Rightarrow 0 < \log_a^{(x-1)} < 1 \Rightarrow \begin{cases} \log_a^{(x-1)} > 0 \Rightarrow x > 1 \\ \log_a^{(x-1)} < 1 \Rightarrow x-1 < a \end{cases} \end{cases}$$

$$\Rightarrow \text{Df: } (1, 3]$$

تاریخ زده شده

$$\text{مثال 7)} y = \log(2\cos x + 1) \Rightarrow 2\cos x + 1 > 0 \Rightarrow \cos x > -\frac{1}{2}$$

$$\text{Df: } (2k\pi - \frac{2\pi}{3}, 2k\pi + \frac{2\pi}{3})$$

$$\text{مثال 8)} y = \sqrt{\log \frac{x-1}{x+1}} \Rightarrow \log \frac{x-1}{x+1} \geq 0 \Rightarrow \frac{x-1}{x+1} \geq 1 \Rightarrow \frac{x-1}{x+1} - 1 \geq 0 \Rightarrow \frac{x-1-x-1}{x+1} \geq 0 \Rightarrow \frac{-2}{x+1} \geq 0$$

$$\Rightarrow x+1 < 0 \Rightarrow x < -1$$

$$\text{Df: } (-\infty, -1)$$