

$$f(x) = \sqrt{(a-2)x^2 + ax + b} \quad \text{اگر } x=2 \rightarrow 9(a-2) + 4a + b = 0 \rightarrow 13a + b = 18 \quad (1)$$

$$D_f = [3, +\infty) \quad \Delta \geq 0 \rightarrow \frac{-a \pm \sqrt{a^2 - 4(a-2)}}{2(a-2)} \rightarrow -a = 4a - 12 \rightarrow 5a = 12 \rightarrow a = \frac{12}{5} \Rightarrow 13\left(\frac{12}{5}\right) + b = 18 \rightarrow b = -\frac{11}{5}$$

$$f(x) = \sqrt{x^2 + 2x + 2 - m^2} \rightarrow D_f = \mathbb{R} \quad \Delta \leq 0 \rightarrow 4 - 1 + 4m^2 \leq 0 \rightarrow 4m^2 \leq -3 \rightarrow m^2 \leq -\frac{3}{4} \rightarrow -1 \leq m \leq 1 \quad (2)$$

میانگین دو سر $1 - (-1) = 2$

$$f(x) = \frac{\sqrt{4-x^2}}{[x]+[-x]+1} \rightarrow \begin{aligned} &4-x^2 \geq 0 \rightarrow x^2 \leq 4 \rightarrow -2 \leq x \leq 2 \quad (I) \\ &[x]+[-x]+1 \neq 0 \rightarrow x \in \mathbb{Z} \quad (II) \end{aligned} \xrightarrow{I \cap II} D_f = [-2, 2] \rightarrow \text{عدد صحیح } \Delta \rightarrow -2, -1, 0, 1, 2$$

$$f(x) = \sqrt{x^2 + 3x} \rightarrow x^2 + 3x \geq 0 \rightarrow x(x+3) \geq 0 \rightarrow x \leq -3 \text{ یا } x \geq 0 \rightarrow D_f = [-3, +\infty) \quad (3)$$

$$f(x) = \sqrt{\frac{(x^2-1)(x^2-3x)}{x^2-1}} \rightarrow \frac{(x^2-1)(x^2-3x)}{x^2-1} \geq 0 \rightarrow \frac{(x^2-1)x^2(x-3)}{x^2-1} \geq 0 \rightarrow x = -1, 1, 0, 3 \rightarrow D_f = (-\infty, -1] \cup [3, +\infty)$$

$$f(x) = \sqrt{|x-2|-3} \rightarrow |x-2|-3 \geq 0 \rightarrow |x-2| \geq 3 \rightarrow \begin{aligned} &x-2 \geq 3 \rightarrow x \geq 5 \\ &x-2 \leq -3 \rightarrow x \leq -1 \end{aligned} \rightarrow D_f = (-\infty, -1] \cup [5, +\infty) \quad (4)$$

$$f(x) = \sqrt{4-|2-x|} \rightarrow 4-|2-x| \geq 0 \rightarrow |2-x| \leq 4 \rightarrow -4 \leq 2-x \leq 4 \rightarrow -6 \leq -x \leq 2 \rightarrow -2 \leq x \leq 6 \rightarrow D_f = [-2, 6]$$

$$f(x) = \sqrt{1-x|x|} \rightarrow \begin{aligned} &1-x|x| \geq 0 \xrightarrow{x \geq 0} 1-x^2 \geq 0 \rightarrow x^2 \leq 1 \rightarrow -1 \leq x \leq 1 \quad (I) \\ &1-x|x| \geq 0 \xrightarrow{x < 0} 1+x^2 \geq 0 \rightarrow x^2 \geq -1 \rightarrow x \in \mathbb{R} \quad (II) \end{aligned} \xrightarrow{I \cap II} D_f = [-1, 0]$$

$$f(x) = \frac{1}{\sqrt{3-|x-5|-1}} \rightarrow 3-|x-5|-1 > 0 \rightarrow |x-5| < 2 \rightarrow -2 < x-5 < 2 \rightarrow 3 < x < 7 \rightarrow D_f = (3, 7)$$

$$f(x) = \frac{\sin^2 x - 1}{\cos x} \rightarrow \cos x \neq 0 \rightarrow x \neq k\pi + \frac{\pi}{2} \rightarrow D_f = \mathbb{R} - \left\{k\pi + \frac{\pi}{2}\right\} \quad (5)$$

$$f(x) = \frac{\cos x}{2\cos x - 1} \rightarrow 2\cos x - 1 \neq 0 \rightarrow 2\cos x \neq 1 \rightarrow \cos x \neq \frac{1}{2} \rightarrow x \neq 2k\pi \pm \frac{\pi}{3} \rightarrow D_f = \mathbb{R} - \left\{2k\pi \pm \frac{\pi}{3}\right\}$$

$$f(x) = \frac{x-3}{|2x+1|-|x+3|} \rightarrow \begin{aligned} &|2x+1|-|x+3| \neq 0 \rightarrow (2x+1)^2 - (x+3)^2 \neq 0 \rightarrow 4x^2 + 4x + 1 - x^2 - 6x - 9 \neq 0 \rightarrow 3x^2 - 2x - 8 \neq 0 \\ &3x^2 - 2x - 8 = 0 \rightarrow (x-4)(x+2) = 0 \rightarrow x = 4, -\frac{2}{3} \end{aligned} \rightarrow D_f = \mathbb{R} - \left\{4, -\frac{2}{3}\right\}$$

$$f(x) = \sqrt{|2x+1|-|x+3|} \rightarrow |2x+1|-|x+3| \geq 0 \rightarrow (2x+1)^2 - (x+3)^2 \geq 0 \rightarrow 3x^2 - 2x - 8 \geq 0 \rightarrow (x-4)(x+2) \geq 0 \rightarrow x \leq -2 \text{ یا } x \geq 4 \rightarrow D_f = (-\infty, -2] \cup [4, +\infty)$$

$$f(x) = \sqrt{\log_{\frac{1}{10}} \log_{\frac{1}{10}}^{(2x-1)}} \rightarrow \log_{\frac{1}{10}} \log_{\frac{1}{10}}^{(2x-1)} \geq 0 \rightarrow \log_{\frac{1}{10}}^{(2x-1)} \leq 1 \rightarrow 2x-1 \leq 10 \rightarrow 2x \leq 11 \rightarrow x \leq \frac{11}{2} \text{ (I)}$$

$$\log_{\frac{1}{10}}^{(2x-1)} > 0 \rightarrow 2x-1 > 1 \rightarrow 2x > 2 \rightarrow x > 1 \text{ (II)} \quad \underline{I \cap II \cap III} \rightarrow D_f = (1, \frac{11}{2}]$$

$$2x-1 > 0 \rightarrow 2x > 1 \rightarrow x > \frac{1}{2} \text{ (III)}$$

$$\text{ج) } y = \log_{\frac{1}{10}}^{(2 \cos x + 1)} \rightarrow 2 \cos x + 1 > 0 \rightarrow 2 \cos x > -1 \rightarrow \cos x > -\frac{1}{2} \rightarrow D_f = \left(\frac{7\pi}{6}, \frac{5\pi}{6} \right) \text{ (I)}$$

$$\text{ب) } y = \sqrt{\log_{\frac{1}{10}} \frac{x-1}{x+1}} \rightarrow \log_{\frac{1}{10}} \frac{x-1}{x+1} \geq 0 \rightarrow \frac{x-1}{x+1} \geq 1 \rightarrow \frac{x-1}{x+1} - 1 \geq 0 \rightarrow \frac{x-1-(x+1)}{x+1} \geq 0 \rightarrow \frac{-2}{x+1} \geq 0$$

$$\rightarrow x+1 < 0 \rightarrow x < -1 \text{ (I)}$$

$$\rightarrow \frac{x-1}{x+1} > 0 \rightarrow \frac{-1}{+ \oplus - \oplus +} \text{ (II)}$$

$$\underline{I \cap II} \rightarrow D_f = (-\infty, -1)$$