

$$2x^2 - 5x + 1 + y^2 + 4y + 9 = -k + 2 + 9 \rightarrow (\sqrt{2x} - \sqrt{2})^2 + (y+2)^2 = -1-k+11$$

$$\rightarrow \boxed{k=11}$$

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$$f(x) \begin{cases} x^2 + 2x & ; x \geq a \\ 2x + a + 2 & ; x < a \end{cases} \rightarrow x^2 + 2x = 2x + a + 2 \xrightarrow{x=a} a^2 + 2a = 2a + a + 2 \rightarrow a^2 + a - 2 = 0 \rightarrow (a-1)(a+2) = 0$$

$$a \neq 0 \rightarrow a = 1$$

$$f(1) = 1 + 2 = 2 + 1 + 2 = 5$$

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$$f(x) \begin{cases} 2x^2 - b & ; |x+1| \geq 2 \rightarrow \begin{cases} x+1 \geq 2 \rightarrow x \geq 1 \\ x+1 \leq -2 \rightarrow x \leq -3 \end{cases} \\ a + 2x & ; -2 \leq x \leq -1 \end{cases}$$

$$\text{با توجه به } x = -3 \Rightarrow 2(-3)^2 - b = a + 2(-3) \rightarrow 18 - b = a - 6 \rightarrow a + b = 18 + 6 = 24$$

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$$y = \sqrt{4x-a} + \sqrt{b-3x}$$

$$\begin{cases} 4x-a \geq 0 \rightarrow 4x \geq a \rightarrow x \geq \frac{a}{4} \\ b-3x \geq 0 \rightarrow 3x \leq b \rightarrow x \leq \frac{b}{3} \end{cases} \rightarrow \frac{a}{4} = \frac{b}{3} = 2 \rightarrow \begin{cases} a=8 \\ b=6 \end{cases} \rightarrow \frac{b}{a} = \frac{6}{8} = \frac{3}{4}$$

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$$\text{الف)} \begin{cases} \frac{x+1}{|x-3|} \geq 0 \xrightarrow{x \neq 3} \frac{x+1}{x-3} \geq 0 \rightarrow [1, +\infty) \cup (-\infty, -1] \\ x-3=0 \rightarrow x=3 \end{cases} \rightarrow D_f = [1, +\infty) \cup (-\infty, -1] \cup \{3\}$$

$$\begin{cases} \frac{4-x}{x^2+2x+2} \geq 0 \xrightarrow{x \neq -1} \frac{4-x}{x^2+2x+2} \geq 0 \rightarrow [4, +\infty) \\ x^2+2x+2=0 \rightarrow \Delta < 0 \rightarrow \text{همیشه مثبت} \end{cases} \rightarrow D_f = [4, +\infty)$$

$$\text{ب)} \begin{cases} [x] - 2 \geq 0 \rightarrow [x] \geq 2 \rightarrow x \geq 2 \\ 2 - [x] \geq 0 \rightarrow [x] \leq 2 \rightarrow x < 3 \end{cases} \xrightarrow{\text{تقاطع}} D_f = \emptyset$$

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$$a) \frac{x^2 - x - 4}{x^2 - 13x + 44} \geq 0 \rightarrow \frac{(x-4)(x+1)}{(x-4)(x-11)} \geq 0 \rightarrow x \mid \frac{-4}{+} \frac{-1}{-} \frac{1}{-} \frac{11}{+} \rightarrow D_f = (-\infty, -4) \cup (-1, 1) \cup (11, +\infty)$$

$$b) \frac{(x-1)(x^2 - x - 4)}{(x+1)(x-2)(x+3)} \geq 0 \rightarrow x \mid \frac{-1}{+} \frac{-2}{-} \frac{-4}{+} \frac{1}{-} \frac{3}{+} \rightarrow D_f = (-\infty, -3) \cup (-1, 1) \cup (1, 2) \cup (4, +\infty)$$

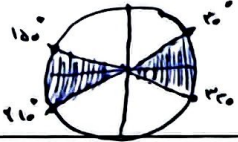
$$a) [-x] - 2 \geq 0 \rightarrow [-x] \geq 2 \rightarrow D_f = (-\infty, -2]$$

$$D_f = \mathbb{R} - [-1, 2) \cup [2, 3]$$

$$b) \frac{\sin x + 2}{[x]^2 + [x] - 2} \rightarrow \begin{cases} [x]^2 + [x] - 2 \neq 0 \\ ([x] - 1)([x] + 2) \neq 0 \end{cases} \rightarrow \begin{cases} [x] - 2 \neq 0 \rightarrow [x] \neq 2 \rightarrow 2 \leq x < 3 \\ [x] + 1 \neq 0 \rightarrow [x] \neq -1 \rightarrow -1 \leq x < 0 \end{cases}$$

$$a) \tan x + 1 = 0 \rightarrow \tan x \neq -1 \rightarrow \text{Unit Circle} \rightarrow D_f = \mathbb{R} - \left\{ k\pi - \frac{\pi}{4} \right\}$$

$$b) 1 - 2 \sin^2 x \geq 0 \rightarrow \sin^2 x \leq \frac{1}{2} \rightarrow -\frac{1}{\sqrt{2}} \leq \sin x \leq \frac{1}{\sqrt{2}} \rightarrow D_f = \left[k\pi - \frac{\pi}{4}, k\pi + \frac{\pi}{4} \right]$$



$$a) \begin{cases} 1 - \log_{\frac{1}{2}} x \geq 0 \rightarrow \log_{\frac{1}{2}} x \leq 1 \rightarrow x \geq \frac{1}{2} \rightarrow \overline{x \geq \frac{1}{2}} \\ x - 1 > 0 \rightarrow \overline{x > 1} \end{cases} \rightarrow D_f = \left[\frac{1}{2}, +\infty \right)$$

$$b) \begin{cases} x^2 - x \geq 0 \rightarrow \overline{x \mid \frac{0}{+} \frac{1}{-}} \\ 1 - \log_{\frac{1}{2}} x \neq 0 \rightarrow \log_{\frac{1}{2}} x \neq 1 \rightarrow x \neq \frac{1}{2} \\ x^2 - x > 0 \rightarrow \overline{x \mid \frac{0}{+} \frac{1}{-}} \end{cases} \rightarrow D_f = (-\infty, 0) \cup (1, +\infty) - \left\{ \frac{1}{2} \right\}$$

$$a) x^{2x-x^2} - 1 \geq 0 \rightarrow x^{2x-x^2} \geq 1 \rightarrow x^{2x-x^2} \geq x^0 \rightarrow 2x-x^2 \geq 0 \rightarrow -x^2 + 2x \geq 0 \rightarrow x \mid \frac{0}{+} \frac{2}{+} \rightarrow D_f = [0, 2]$$

$$b) y = \left(\frac{x+2}{x+3} \right)! \rightarrow \frac{x+2}{x+3} \in \mathbb{N} \rightarrow -\frac{x+2}{x+3} = n \rightarrow D_f = \left\{ x \mid x = \frac{-3n+2}{n}, n \in \mathbb{N} \right\}$$