

الف) $\frac{x+3}{(x-1)(2x^2+4x-3)}$ $\Rightarrow (x-1)(2x^2+4x-3) \neq 0$ $x^2+2x-3 \neq 0 \Rightarrow (x+3)(x-1) \neq 0 \Rightarrow x \neq -3 \text{ و } 1$ $\rightarrow D_f = \mathbb{R} - \{-3 \text{ و } 1\}$	ب) $\frac{(x+3)}{(x+1)(2x^2+7x+3)}$ $(2x^2+7x+3) \neq 0 \Rightarrow (x+4)(x+1) \neq 0$ $\Rightarrow x \neq -4 \text{ و } -1$ $\rightarrow D_f = \mathbb{R} - \{-4 \text{ و } -1\}$	
الف) $y = \frac{x+3}{x^3-2x^2+2x-1}$ $\Rightarrow \frac{x+3}{(x-1)(x^2-x+1)}$ $\Rightarrow D_f = \mathbb{R} - \{1\}$	ب) $\sqrt{\frac{x+3}{x^3-2x^2+2x-1}} \geq 0$ $\Rightarrow \frac{x+3}{(x-1)(x^2-x+1)} \geq 0$ $\Rightarrow D_f = (-\infty, -3] \cup (1, +\infty)$	
$x < 1 \Rightarrow x^2+2x-3 \neq 0$ $x^2+2x \neq 0 \Rightarrow x \neq 0$ $x \geq 1 \Rightarrow x^2+2x+4 \neq 0$ $x^2-7x+10 \neq 0 \Rightarrow (x-2)(x-5) \neq 0 \Rightarrow x \neq 2 \text{ و } 5$ $\Rightarrow D_f = \mathbb{R} - \{-3 \text{ و } 0 \text{ و } 2 \text{ و } 5\}$		
الف) $\frac{x+3}{ 2x+1 - x+3 }$ $ 2x+1 - x+3 \neq 0$ $ 2x+1 \neq x+3 $ $2x+1 \neq \pm(x+3)$ $\Rightarrow D_f = \mathbb{R} - \{2, -\frac{4}{3}\}$	ب) $ 2x+1 - x+3 \geq 0 \Rightarrow 2x+1 \geq x+3 $ $\Rightarrow (2x+1)^2 \geq (x+3)^2 \Rightarrow (2x+1)^2 - (x+3)^2 \geq 0$ $\Rightarrow (2x+1+x+3)(2x+1-x-3) \geq 0$ $\Rightarrow (3x+4)(x-2) \geq 0$ $\Rightarrow D_f = (-\infty, -\frac{4}{3}] \cup [2, +\infty)$	
الف) $\boxed{x > 0}$ $1 - \log_3 x > 0 \rightarrow D_f = (0, 3)$ $\log_3 x < 1 \rightarrow \boxed{x < 3}$	ب) $\boxed{x > 0}$ $1 - \log_3 \frac{x}{4} > 0 \rightarrow \log_3 \frac{x}{4} < 1 \rightarrow \boxed{x > \frac{4}{3}}$ $\rightarrow \textcircled{1} \cap \textcircled{2} \rightarrow \boxed{x > \frac{4}{3}}$ $D_f = (\frac{4}{3}, +\infty)$	

$$2x-1 > 0 \rightarrow 2x > 1 \rightarrow \textcircled{1} \boxed{x > \frac{1}{2}}$$

$$\log_{\frac{1}{2}}(2x-1) > 0 \rightarrow 2x-1 > 1 \rightarrow 2x > 2 \rightarrow \textcircled{2} \boxed{x > 1}$$

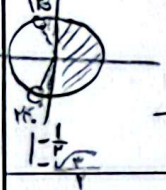
$$\log_{\frac{1}{2}} \log_{\frac{1}{2}}(2x-1) \geq 0 \rightarrow \log_{\frac{1}{2}}(2x-1) \leq 1 \rightarrow 2x-1 \leq 2 \rightarrow 2x \leq 3 \rightarrow \textcircled{3} \boxed{x \leq \frac{3}{2}}$$

$$\textcircled{1} \cap \textcircled{2} \cap \textcircled{3} \rightarrow D_f = (1, \frac{3}{2}]$$

الف) $\log(2\cos x + 1)$

$$\rightarrow 2\cos x + 1 > 0$$

$$2\cos x > -1 \rightarrow \boxed{\cos x > -\frac{1}{2}}$$



$$\rightarrow D_f = (2k\pi - \frac{2\pi}{3}, 2k\pi + \frac{2\pi}{3}) \Rightarrow \textcircled{1} \cap \textcircled{2} \rightarrow (-1, \infty)$$

ب) $\sqrt{\log \frac{x-1}{x+1}} \rightarrow \frac{x-1}{x+1} > 0 \rightarrow \frac{x-1}{x+1} > 1 \rightarrow \frac{-2}{x+1} > 0$
 $\Rightarrow x+1 < 0 \Rightarrow \textcircled{2} \boxed{x < -1}$
 $\Rightarrow \textcircled{1} \cap \textcircled{2} \rightarrow (-\infty, -1) \cup (1, \infty)$

$$\log \frac{x-1}{x+1} > 0 = \log_{\frac{1}{2}} 1 \Rightarrow \frac{x-1}{x+1} > 1 \rightarrow \frac{-2}{x+1} > 0$$

$$\Rightarrow x+1 < 0 \Rightarrow \textcircled{2} \boxed{x < -1}$$

$$\Rightarrow \textcircled{1} \cap \textcircled{2} \rightarrow (-\infty, -1)$$

$\Rightarrow f(x) = \sqrt{(a+2)x^2 + ax + b} \rightarrow D_f = (-\infty, 3] \Rightarrow$ چون بازه پیوسته است، پس عبارت تکرر شده بوده و ریشه آن $\textcircled{3}$ است. (و ضریب منفی بوده)

لکه دو حالت دارد یا $(x-3)(x+3) = 0$ یا $x = 3$ یا $x = -3$ اما این ندارد

$$\Rightarrow f(x) = \sqrt{-2x + b}$$

$\Rightarrow$ پس باید ضریب x را منفی در نظر بگیریم $\Rightarrow \boxed{a = -2}$

$$x=3 \rightarrow 0 = -4 + b \Rightarrow \boxed{b = 4}$$

$$\Rightarrow f(x) = \sqrt{-2x + 4}$$

$$f(x) = \sqrt{x^2 + 2x + 2 - m^2}$$

$$\rightarrow x^2 + 2x + 2 - m^2 \geq 0$$

$$\Rightarrow \begin{cases} 1 > 0 \checkmark \\ \Delta' \leq 0 \rightarrow f(-1) + fm^2 \leq 0 \Rightarrow \frac{1}{2} + m^2 \leq 0 \Rightarrow \boxed{m^2 \leq 1} \rightarrow -1 \leq m \leq 1 \end{cases}$$

$$\Rightarrow m_{\max} = 1, m_{\min} = -1 \Rightarrow 1 - (-1) = \boxed{2}$$

$$f(x) = \frac{\sqrt{4-x^2}}{[x] + [-x] + 1}$$

$$[x] + [-x] \begin{cases} x \in \mathbb{Z} \Rightarrow = 0 \checkmark \\ x \notin \mathbb{Z} \Rightarrow = -1 \end{cases}$$

$$\Rightarrow \boxed{x \in \mathbb{Z}}$$

$$2) 4 - x^2 \geq 0 \rightarrow x^2 \leq 4 \rightarrow \boxed{-2 \leq x \leq 2}$$

$$D_f = \{-2, -1, 0, 1, 2\}$$

لکه پنج عدد صحیح.