

الف) $y = \frac{x+3}{x^3 + 3x^2 - 11x + 3} \rightarrow$ جمع ضرایب $\rightarrow 2(x-1)(x+3)(x-\frac{1}{2}) \neq 0$ (2)

ب) $y = \frac{x+3}{x^3 + 9x^2 + 10x + 3} \rightarrow$ جمع ضرایب توانهای زوج در فرد برابر $\Rightarrow D_f = \mathbb{R} - \{-3, -\frac{1}{2}, 1\}$ ✓

الف) $y = \frac{x+3}{x^3 - 2x^2 + 2x - 1} \rightarrow$ جمع ضرایب $\rightarrow x^3 - 2x^2 + 2x - 1 \neq 0 \rightarrow (x-1)(x^2 - x + 1) \neq 0$ (2)

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

$y = \frac{1}{x^2 - \omega|x-1| - 2x + \omega} \Rightarrow$ $\begin{cases} x^2 - 7x + 10 < 0; x > 1 \rightarrow (x-2)(x-5) \neq 0 \\ x^2 - 2x + \omega < 0; x = 1 \rightarrow \Delta < 0 \\ x^2 + 3x < 0; x < 1 \rightarrow x(3+x) \neq 0 \end{cases}$

$\Rightarrow D_f = \mathbb{R} - \{-3, 0, 1, \omega\}$ ✓ (2)

الف) $y = \frac{x+3}{|2x+1| - |x+3|} \Rightarrow |2x+1| - |x+3| \neq 0 \rightarrow |2x+1| \neq |x+3| \xrightarrow{\text{تقریب}} x^2 + 2x + 1 \neq x^2 + 6x + 9$ (2)

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

الف) $y = \log_p(1 - \log_p x) \rightarrow x > 0 \Rightarrow 1 - \log_p x > 0 \rightarrow \log_p x < 1 \rightarrow x < p = 3 \Rightarrow D_f = (0, 3)$ ✓

ب) $y = \log_p(1 - \log_p \frac{x}{p}) \Rightarrow x > 0$ $1 - \log_p \frac{x}{p} > 0 \rightarrow \log_p \frac{x}{p} < 1 \rightarrow x < p = 3 \Rightarrow D_f = (\frac{1}{p}, +\infty)$ ✓ (2)

$$f(x) = \sqrt{\log_{\omega} \log_{\omega} (x-1)} \rightarrow \begin{aligned} &x-1 > 0 \rightarrow x > 1 \\ &\log_{\omega} (x-1) > 0 \rightarrow x-1 > 1 \rightarrow x > 2 \\ &\log_{\omega} \log_{\omega} (x-1) > 0 \rightarrow \log_{\omega} (x-1) > 1 \rightarrow x-1 > \omega \rightarrow x > \omega+1 \end{aligned}$$

$\Rightarrow D_f = (1, \omega]$ ✓

الف) $y = \log(x \cos x + 1) \rightarrow x \cos x + 1 > 0 \rightarrow \cos x > -\frac{1}{x}$

$\Rightarrow D_f = \left(\frac{1}{\sqrt{e}}, \frac{1}{\sqrt{e}} + \frac{1}{\sqrt{e}} \right)$ ✓

ب) $y = \sqrt{\log \frac{x-1}{x+1}} \rightarrow \frac{x-1}{x+1} > 0 \rightarrow \frac{-1}{x+1} > 0 \rightarrow x < -1$

$\log \frac{x-1}{x+1} > 0 \rightarrow \frac{x-1}{x+1} > 1 \rightarrow \frac{x-1-(x+1)}{x+1} > 0 \rightarrow \frac{-2}{x+1} > 0 \Rightarrow x+1 < 0 \rightarrow x < -1$

$\Rightarrow D_f = (-\infty, -1)$ ✓

$f(x) = \sqrt{(a+x)x^2 + bx + c}$ چون $a > 0$ و $a = -1$ پس $a = -1$

$\Rightarrow f(x) = \sqrt{-x^2 + bx + c} \Rightarrow -x^2 + bx + c \geq 0 \Rightarrow -x^2 + bx + c = 0 \Rightarrow b = 4$ ✓

$\Rightarrow f(x) = \sqrt{-x^2 + 4x + 5}$

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

$a=1, b=1, c=1-m^2 \Rightarrow b^2 - 4ac \leq 0 \rightarrow 1 - 4(1-m^2) \leq 0 \rightarrow m^2 \leq 1 \rightarrow -1 \leq m \leq 1$

$\rightarrow 1 - (-1) = 2$

$\frac{-b}{2a} = \frac{-1}{2} = -\frac{1}{2} \rightarrow 1 - 1 + (1-m^2) \geq 0 \rightarrow 1-m^2 \geq 0 \rightarrow -1 \leq m \leq 1 \Rightarrow 1 - (-1) = 2$ ✓

$f(x) = \frac{\sqrt{f-x^2}}{[x] + [-x] + 1} \rightarrow f-x^2 \geq 0 \rightarrow -x^2 \geq -f \rightarrow x^2 \leq f \rightarrow |x| \leq \sqrt{f}$

$[x] + [-x] + 1 \neq 0 \rightarrow \begin{cases} 1 & x \in \mathbb{Z} \\ 0 & x \notin \mathbb{Z} \end{cases}$

$\Rightarrow D_f = \{x | x \in \mathbb{Z}, |x| \leq \sqrt{f}\}$ ✓