

نام و نام خانوادگی: ... مدیر: ... شماره: ... کلاس: ... نام: ...

$$\begin{aligned}
 2x^2 + y^2 - 4x + 4y + 1 &= 0 \Rightarrow 2x^2 - 4x + y^2 + 4y + 1 = 0 \Rightarrow 2x^2 - 4x \\
 &\Rightarrow 2(x^2 - 2x) \Rightarrow 2((x-1)^2 - 1) \Rightarrow 2(x-1)^2 - 2 \quad y^2 + 4y \Rightarrow (y+2)^2 - 4 \\
 2(x-1)^2 - 2 + (y+2)^2 - 4 + 1 &= 0 \Rightarrow 2(x-1)^2 + (y+2)^2 + 1 - 11 = 0 \\
 &\Rightarrow 2(x-1)^2 + (y+2)^2 = 10 \quad 11 - 1 = 10 \Rightarrow 10 = 10
 \end{aligned}$$

$$\begin{aligned}
 f(x) &= \begin{cases} x^2 + 2x & x \geq 1 \\ 2x + 1 & x < 1 \end{cases} \Rightarrow x = 1 \Rightarrow 1^2 + 2 \cdot 1 = 2 \cdot 1 + 1 \\
 &\Rightarrow 1^2 + 2 \cdot 1 = 2 \cdot 1 + 1 \Rightarrow 1^2 + 2 - 2 = 0 \Rightarrow (1+2)(1-1) = 0 \quad \begin{cases} x = -2 \\ x = 1 \end{cases} \Rightarrow x = 1 \\
 f(1) &= (1)^2 + 2(1) = 1 + 2 = 3 \quad \text{or} \quad 2(1) + 1 = 3
 \end{aligned}$$

$$\begin{aligned}
 f(x) &= \begin{cases} x^2 - b & |x+1| \geq 2 \\ x + 2 & -2 \leq x \leq -1 \end{cases} \Rightarrow |x+1| \geq 2 \Rightarrow x+1 \geq 2 \quad \text{or} \quad x+1 \leq -2 \\
 &\Rightarrow x \geq 1 \quad \Rightarrow x \leq -3 \Rightarrow x = -3 \Rightarrow 2(-3)^2 - b = x + 2(-3) \\
 &\Rightarrow 18 - b = x - 4 \Rightarrow x + b = 22
 \end{aligned}$$

$$\begin{aligned}
 y &= \sqrt{4x-x} + \sqrt{b-3x} \Rightarrow x=2 \Rightarrow \sqrt{4-2} + \sqrt{b-6} = 0 \quad 4-2=0 \quad b-6=0 \\
 x=2 \quad b=6 &\Rightarrow \frac{b}{x} = \frac{6}{2} = \frac{1}{\frac{1}{3}}
 \end{aligned}$$

$$\begin{aligned}
 \text{از آن} \quad y &= \sqrt{\frac{x+1}{x-3}} + \sqrt{\frac{4-x}{x^2+x+2}} \Rightarrow x+1 \Rightarrow \frac{x+1}{x-3} + \frac{4-x}{x^2+x+2} \\
 4-x &\Rightarrow \frac{x+1}{x-3} + \frac{4-x}{x^2+x+2} \Rightarrow x \geq -1 \quad \text{و} \quad x \leq 4 \Rightarrow D_f = [1, 4] \Rightarrow [1, 4] \\
 &\quad / \quad D_f = [1, 4] \Rightarrow D_f = [-1, 4] - \{3\} \\
 \text{ب) } \sqrt{x-4} + \sqrt{4-x} &\Rightarrow [x] - 4 \geq 0 \Rightarrow [x] \geq 4 \Rightarrow x \geq 4
 \end{aligned}$$

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۲- و ۳ هر ریشه در نمره کامل و هم ریشه در صورت به هم می افتد

الف) $\sqrt{\frac{x^2-x-6}{x^2+2x+1}} \Rightarrow \sqrt{\frac{(x-3)(x+2)}{(x+1)(x+1)}} \Rightarrow \frac{x-3}{x+1}$ $D_f = \{-\infty, -3\} \cup (2, +\infty) - \{-1\}$	۶
گزینه (ب) $\sqrt{\frac{x^3-2x^2-2x+4}{x^3+2x^2-2x-4}} \Rightarrow \sqrt{\frac{(x-1)(x-2)(x+2)}{(x+1)(x+2)(x-2)}} \Rightarrow \frac{x-1}{x+1}$ $D_f = (-\infty, -3) \cup [-2, -1) \cup (1, 2) \cup [3, +\infty)$	۶
الف) $y = \sqrt{-x} - 2 \Rightarrow [-x] - 2 \geq 0 \Rightarrow [-x] \geq 2 \Rightarrow -x \geq 2$ $\Rightarrow x \leq -2 \Rightarrow D_f = \{-\infty, -2\}$	۷
$\frac{\cos x + 4}{(\cos x)^2 - 2(\cos x) - 3} \Rightarrow \frac{(\cos x)^2 - 2(\cos x) - 3 \neq 0 \Rightarrow (\cos x - 3)(\cos x + 1)}$ $\Rightarrow \cos x \neq 3 \Rightarrow x \neq [3, \infty) \text{ و } \cos x \neq -1 \Rightarrow x \neq [-1, 0] \Rightarrow D_f = \mathbb{R} - [(-1, 0) \cup (3, \infty)]$	۷
الف) $y = \frac{\cos x + 1}{\tan x + 1} \Rightarrow \tan x + 1 \neq 0 \Rightarrow \tan x \neq -1 \Rightarrow \frac{\sin x}{\cos x} \neq -1$ $D_f = \mathbb{R} - \{k\pi - \frac{\pi}{4}\}$ و $D_f = \mathbb{R} - \{2k\pi - \frac{\pi}{4}, 2k\pi + \frac{3\pi}{4}\}$	۸
$1 - \sin^2 x \Rightarrow 1 - \sin^2 x \geq 0 \Rightarrow 1 \geq \sin^2 x \Rightarrow \frac{1}{\sqrt{e}} \geq \sin^2 x \Rightarrow -\frac{1}{\sqrt{e}} \leq \sin x \leq \frac{1}{\sqrt{e}}$ $D_f = [k\pi - \frac{\pi}{4}, k\pi + \frac{\pi}{4}]$	۸
الف) $y = \sqrt{1 - \log \frac{x-1}{x}} \Rightarrow 1 - \log \frac{x-1}{x} \geq 0 \Rightarrow 1 \geq \log \frac{x-1}{x} \Rightarrow x-1 \geq 0 \Rightarrow x \geq 1$ $x-1 \leq \frac{1}{x} \Rightarrow x \leq \frac{x}{x-1}$ $D_f = [1, \frac{x}{x-1}]$	۹
ب) $\frac{\sqrt{x^2-x}}{1 - \log \frac{x^2-x}{x}} \Rightarrow \sqrt{x^2-x} \geq 0 \Rightarrow x^2-x \geq 0 \Rightarrow x(x-1) \geq 0 \Rightarrow \frac{x}{x-1} \geq \frac{1}{x-1} \Rightarrow (-\infty, 0) \cup [1, +\infty)$ $\frac{1 - \log \frac{x^2-x}{x}}{x^2-x} \neq 0 \Rightarrow 1 \neq \log \frac{x^2-x}{x} \Rightarrow x^2-x \neq e \Rightarrow x^2-x-e \neq 0 \Rightarrow (x-e)(x+1) \neq 0 \Rightarrow x \neq e \text{ و } x \neq -1$ $x^2-x \geq 0 \Rightarrow x(x-1) \geq 0 \Rightarrow \frac{x}{x-1} \geq \frac{1}{x-1} \Rightarrow (-\infty, 0) \cup (3, +\infty) \Rightarrow D_f = (-\infty, 0) \cup (3, +\infty) - \{e, -1\}$	۹
الف) $\sqrt{x^2-x} - 1 \Rightarrow \sqrt{x^2-x} \geq 1 \Rightarrow x^2-x \geq 1 \Rightarrow x^2-x-1 \geq 0$ $\Rightarrow x^2-x-1 \geq 0 \Rightarrow x^2-(x+1) \leq 0 \Rightarrow (x-1)(x+1) \leq 0 \Rightarrow \frac{x}{x+1} \geq \frac{1}{x+1} \Rightarrow D_f = [1, 1]$	۹
ب) $y = \left(\frac{x^2+2}{x^2+1} \right) \Rightarrow \frac{x^2+2}{x^2+1} \in W \Rightarrow x^2+2 = x^2+1 + w \Rightarrow x^2-x^2 = w-1 \Rightarrow w = x^2+1$ $x(x^2-x^2) = w-1 \Rightarrow x = \frac{w-1}{x^2-x^2} \Rightarrow D_f = \{x x = \frac{w-1}{x^2-x^2}, w \in W\}$	۱۰