

الف) $f(x) + 2$	ب) $2f(x)$	ج) $f(x-1)$	د) $-f(x)$	1
ریشه‌ها: (2), (3) الف) $x^2 - 5x + 4 > 0$	ریشه‌ها: (1), (4) ب) $x^2 - 4x + 5 < 0$	ریشه‌ها: (1), (5) ج) $x^2 + 4x + 5 \geq 0$	ریشه‌ها: (1), (4) د) $x^2 - 7x + 4 < 0$	2
x + - + y + 0 - 0 + $x = (-\infty, -3) \cup (-2, +\infty)$	x + - + y + 0 - 0 + $x = (1, 5)$	x - + - + y + 0 - 0 + $x = (-\infty, -5] \cup [-1, +\infty)$	x + - + y + 0 - 0 + $x = [1, 4]$	
الف) $x^2 - 3x + 2/x - 5 < 0$	x - + - + y - 0 + 0 - 0 + $x = (-\infty, 1) \cup (2, 5)$	ب) $x^2 - 1/x^2 - 4x + 5 \geq 0$	x - + - + y + 0 - 0 + 0 - 0 + $x = (-\infty, -1] \cup (5, +\infty)$	3
الف) $y = \sqrt{x^2 - 1}/(x^2 - x) \rightarrow x^2 - 1/(x^2 - x) \geq 0$	x - + - + y + 0 - 0 + 0 - 0 + $P_f = (-\infty, -1) \cup (0, 1) \cup (1, +\infty)$	ب) $y = \sqrt{x^2 - 14}/(x^2 - 5x + 4) \rightarrow x^2 - 14/(x^2 - 5x + 4) \geq 0$	x - + - + y + 0 - 0 + 0 - 0 + $P_f = (-\infty, -4] \cup (1, 4) \cup (4, +\infty)$	4
الف) $y = \sqrt{4 - \sqrt{2 - x}} \rightarrow 2 - x \geq 0 \rightarrow x \leq 2$ $\rightarrow x \geq -14 \quad P_f = [-14, 2]$	ب) $y = \sqrt{3 - \sqrt{x - 2}} \rightarrow x - 2 \geq 0 \rightarrow x \geq 2$ $\rightarrow x \leq 11 \quad P_f = [2, 11]$	ج) $\sqrt{2 - x} \geq 0 \rightarrow \sqrt{2 - x} \leq 4 \rightarrow 2 - x \leq 14$	د) $\sqrt{x - 2} \geq 0 \rightarrow \sqrt{x - 2} \leq 3 \rightarrow x - 2 \leq 9$	5

ا) $y = \sqrt{r - ru^2}$ $r - ru^2 \geq 0 \rightarrow ru^2 \leq r \rightarrow u^2 \leq 1 \rightarrow u \leq \sqrt{r}$ $\rightarrow u \geq -\sqrt{r}$ $D_f = [-\sqrt{r}, \sqrt{r}]$	6
ب) $y = \sqrt{3 u - 9}$ $3 u - 9 \geq 0 \rightarrow 3 u \geq 9 \rightarrow u \geq 3 \rightarrow u \geq 3$ $\rightarrow u \leq -3$ $D_f = (-\infty, -3] \cup [3, +\infty)$	7
ا) $y = \sqrt[3]{ u + 1} / u - r$ $u - r \neq 0 \rightarrow u \neq r \rightarrow u \neq \pm r \Rightarrow D_f = \mathbb{R} - \{\pm r\}$	8
ب) $y = \sqrt[3]{\sqrt{u} + 1} / \sqrt{u} - r$ $\sqrt{u} - r \neq 0 \rightarrow \sqrt{u} \neq r \rightarrow u \neq r^2$ $u \geq 0$ $D_f = [0, +\infty) - \{r^2\}$	9
ا) $y = \sin u / r \cos u - 1 \rightarrow r \cos u - 1 \neq 0 \rightarrow r \cos u \neq 1 \rightarrow \cos u \neq 1/r \Rightarrow$ $D_f = \mathbb{R} - \{r \arccos(1/r), r \arccos(-1/r)\}$ ب) $y = \cos u + 1 / r \sin u + 1 \rightarrow r \sin u + 1 \neq 0 \rightarrow r \sin u \neq -1 \rightarrow \sin u \neq -1/r \Rightarrow$ $D_f = \mathbb{R} - \{r \arcsin(-1/r), r \arcsin(1/r)\}$ ج) $y = \tan u + r / \cot u - 1 \rightarrow \cot u - 1 \neq 0 \rightarrow \cot u \neq 1 \Rightarrow D_f = \mathbb{R} - \{r \arccot(1/r), r \arccot(-1/r)\}$ د) $y = \sin^2 u + 1 / r \sin^2 u - r \rightarrow r \sin^2 u - r \neq 0 \rightarrow r \sin^2 u \neq r \rightarrow \sin^2 u \neq 1/r \rightarrow \sin u \neq \pm \sqrt{1/r}$ $D_f = \mathbb{R} - \{r \arcsin(\sqrt{1/r}), r \arcsin(-\sqrt{1/r})\}$	10
$y = 1 / \sqrt{r u - r - 1/r}$ $r u - r - 1/r > 0 \rightarrow r u - r > 1/r \rightarrow u - r > 1/r^2$ $\rightarrow u - r > 1/r^2 \rightarrow u > r + 1/r^2$ $\rightarrow u - r < -1/r^2 \rightarrow u < r - 1/r^2$ $D_f = (-\infty, r - 1/r^2) \cup (r + 1/r^2, +\infty)$	11
ا) $y = \sqrt{r - r u }$ $r - r u \geq 0 \rightarrow r u \leq r \rightarrow u \leq 1 \rightarrow u \leq 1$ $\rightarrow u \geq -1$ $D_f = [-1, 1]$ ب) $y = \sqrt{ u } / u \rightarrow u \neq 0 \rightarrow u \neq 0$ $D_f = \mathbb{R} - \{0\}$	12