

الف) $y = \frac{x+2}{x^3 - 20x^2 + 31x - 10}$ جمع فزاینده $D_f = \mathbb{R} \setminus \{1, 2\}$ ب) $y = \frac{x+2}{x^3 - x^2 - 11x - 4}$ $D_f = \mathbb{R} \setminus \{-1, -\frac{2}{3}, 2\}$	یکی از ریشه ها ۱ است $x^3 - 20x^2 + 31x - 10 \div (x-1)$ $(x-1)(x^2 - 19x + 10)$ $(x-1)(x-2)(x-5)$ جمع فزاینده توان فرد در مجموع با هم برابر است پس یکی از ریشه ها ۱ است. $x^3 - x^2 - 11x - 4 \div (x+1)$ $(x+1)(x^2 - 2x - 4)$ $(x+1)(x-2)(x+\frac{2}{3})$	۱, ۲ ۱
الف) $y = \frac{x+1}{x - \sqrt{3-2x}}$ $D_f = (-\infty, \frac{3}{2}] \setminus \{-3, 1\}$ ب) $y = \frac{x+2}{x - \sqrt{3x-2}}$ $D_f = [\frac{2}{3}, +\infty) \setminus \{1, 2\}$	$\sqrt{3-2x} \geq 0 \rightarrow 3-2x \geq 0 \rightarrow \frac{3}{2} \geq x \rightarrow x \leq \frac{3}{2}$ $x - \sqrt{3-2x} \neq 0 \rightarrow x \neq \sqrt{3-2x} \rightarrow x^2 \neq 3-2x$ $x^2 + 2x - 3 \neq 0 \rightarrow (x-1)(x+3) \neq 0$ $\sqrt{3x-2} \geq 0 \rightarrow 3x-2 \geq 0 \rightarrow x \geq \frac{2}{3}$ $x - \sqrt{3x-2} \neq 0 \rightarrow x \neq \sqrt{3x-2} \rightarrow x^2 - 3x + 2 \neq 0 \rightarrow (x-1)(x-2) \neq 0$	۲ ۱, ۱۰۰
الف) $y = \frac{\sin x}{x \cos x - 1}$ $x \cos x - 1 \neq 0 \rightarrow \cos x \neq \frac{1}{x}$ ب) $y = \frac{\cos x + 1}{x \sin x + 1}$ $x \sin x + 1 \neq 0 \rightarrow \sin x \neq -\frac{1}{x}$ ج) $y = \frac{\tan x + 2}{\cot x - 1}$ $\cot x - 1 \neq 0 \rightarrow \cot x \neq 1 \rightarrow \begin{cases} \cot x \neq 1 \\ \sin x \neq 0 \end{cases}$ د) $y = \frac{\sin x + 1}{x \sin^2 x - 3}$ $x \sin^2 x - 3 \neq 0 \rightarrow \sin^2 x \neq \frac{3}{x}$	$D_f = \mathbb{R} \setminus \{k\pi - \frac{\pi}{4}, k\pi + \frac{\pi}{4}\}$ $D_f = \mathbb{R} \setminus \{k\pi + \pi + \frac{\pi}{4}, k\pi - \frac{\pi}{4}\}$ $D_f = \mathbb{R} \setminus \{k\pi, k\pi + \frac{\pi}{2}\}$ $D_f = \mathbb{R} \setminus \{k\pi + \frac{\pi}{4}, k\pi + \pi - \frac{\pi}{4}\}$	۱, ۱۰۰
الف) $x^2 - 4x + 4 > 0 \rightarrow (x-2)^2 > 0$ $D_f = (-\infty, 2) \cup (2, +\infty)$ ب) $x^2 - 4x + 4 \geq 0$ $D_f = [1, 4]$ ج) $x^2 + 4x + 4 \geq 0$ $D_f = (-\infty, -2] \cup [-2, +\infty)$ د) $x^2 - 4x + 4 \leq 0$ $D_f = [1, 4]$	$a+b+c=0 \rightarrow \begin{cases} a > 0 \\ b < 0 \\ c < 0 \end{cases}$ $a+b+c=0 \rightarrow \begin{cases} a < 0 \\ b > 0 \\ c > 0 \end{cases}$ $a+b+c=0 \rightarrow \begin{cases} a < 0 \\ b < 0 \\ c > 0 \end{cases}$ $a+b+c=0 \rightarrow \begin{cases} a > 0 \\ b > 0 \\ c < 0 \end{cases}$	۵
الف) $\frac{x^2 - 4x + 2}{x - 4}$ $x - 4 \neq 0 \rightarrow x \neq 4$ ب) $\frac{x^2 - 1}{x^2 - 4x + 4} \geq 0$ $x^2 - 4x + 4 \neq 0$	$D_f = (-\infty, 4) \cup (4, +\infty)$ $D_f = (-\infty, -1) \cup (1, +\infty)$ $D_f = (-\infty, -1] \cup (4, +\infty)$	۱, ۱۰۰

الف) $y = \sqrt{\frac{x^2 - 5x + 3}{x^2 - 1}}$

$\frac{x^2 - 5x + 3}{x^2 - 1} \geq 0$ $\rightarrow$ ① $\rightarrow$ ② $\rightarrow$ ③

$\rightarrow x^2 - 1 \neq 0, x^2 \neq -1 \rightarrow x \neq \pm 1$

$D_f = [3, +\infty)$

2

ب) $y = \sqrt[3]{\frac{x^2 - 5x + 3}{x^2 - 1}}$

$\rightarrow x^2 - 1 \neq 0, x^2 \neq -1 \Rightarrow x \neq \pm 1$

$D_f = \mathbb{R} - \{\pm 1\}$

الف) $y = \log(x^2 - 3x)$ $x^2 - 3x > 0$

$x(x-3) > 0$ $\rightarrow$ ① $\rightarrow$ ② $\rightarrow$ ③ $D_f = (-\infty, 0) \cup (3, +\infty)$

ب) $y = \log |4 - x^2|$ $|4 - x^2| > 0$

$4 - x^2 > 0 \rightarrow x^2 < 4 \rightarrow -2 < x < 2$ $\rightarrow$ ① $\rightarrow$ ② $\rightarrow$ ③ $D_f = (-2, 2)$

ج) $y = \log \frac{x^2 - 5x + 3}{x - 2}$ $\frac{x^2 - 5x + 3}{x - 2} > 0$

$\rightarrow$ ① $\rightarrow$ ② $\rightarrow$ ③ $D_f = (2, 10) - \{9\}$

د) $y = \sqrt{x^2 - 11x + 18} + \log \sqrt{4 - x^2}$ $\begin{cases} x^2 - 11x + 18 \geq 0 \\ 4 - x^2 > 0 \end{cases}$

$\rightarrow$ ① $\rightarrow$ ② $\rightarrow$ ③ $D_f = (0, 4) - \{1\}$

$y = \frac{x^2 - x}{x^2 + x}$

$x^2 - x$	$-$	0	$+$	$-$	0	$+$
$x^2 + x$	$+$	0	$+$	$+$	0	$+$
$D(x)$	$+$	0	$+$	$+$	0	$+$

$\frac{x^2 - x}{x^2 + x}$

$x^2 - x$	$-$	0	$+$	$-$	0	$+$
$x^2 + x$	$+$	0	$+$	$+$	0	$+$
$D(x)$	$+$	0	$+$	$+$	0	$+$

5

$y = \sqrt{\frac{x - f(x)}{f(x)}}$

$\frac{x - f(x)}{f(x)} \geq 0, f(x) \neq 0$ $\begin{cases} x = f(x) = [2, 3] \\ f(x) \neq 0 \Rightarrow f(x) \neq -5, 2 \end{cases}$

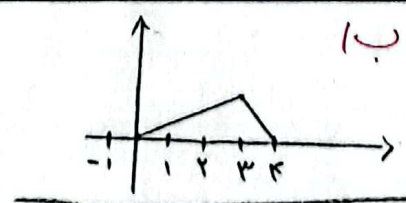
$\frac{x - f(x)}{f(x)}$

$x - f(x)$	$-$	0	$+$	$-$	0	$+$
$f(x)$	$+$	0	$+$	$+$	0	$+$
$D(x)$	$+$	0	$+$	$+$	0	$+$

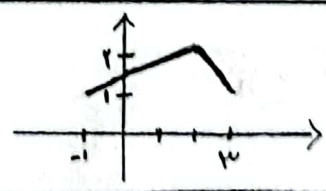
$D_f = (-\infty, -2) \cup (2, 3) \cup (3, +\infty)$

6

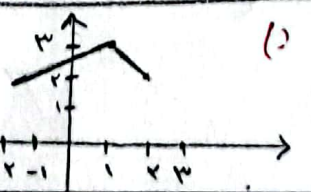
الف) $f(x) + 1$



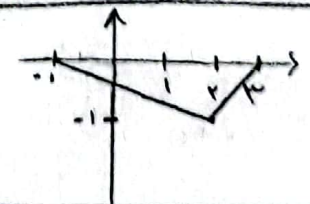
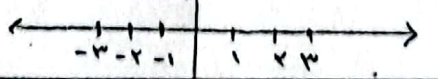
ب) $f(x-1)$



ج) $-f(x)$



د) $f(x+1) + 2$



7