

الف) $y = \frac{n+2}{n^3 - 2n^2 + 3n - 15} = \frac{n+2}{(n-1)(n-3)(n-5)}$

$n^3 - 2n^2 + 3n - 15 \mid n-1$ $n=1$ $n=\frac{3}{2}$ $n=\frac{5}{2}$

$n^3 - 2n^2 + 3n - 15 \mid n-1$ $n^2 - 1 \mid n+1$

$D_f = R - \left\{1, \frac{3}{2}, \frac{5}{2}\right\}$

۱

ب) $y = \frac{n+2}{n^3 - 2n^2 - 11n - 6} = \frac{n+2}{(n+1)(n^2 - 3n - 6)}$

$n^3 - 2n^2 - 11n - 6 \rightarrow n^2 - 3n - 12 \rightarrow (n-6)(n+2)$

$D_f = R - \left\{-1, 2, -\frac{2}{3}\right\}$

الف) $y = \frac{n+1}{n - \sqrt{2n-2}}$

$2n-2 \geq 0$ $n - \sqrt{2n-2} \neq 0$

$n \leq \frac{2}{2}$ $2n-2 \neq n^2$

$n^2 + 2n - 2 \neq 0$

$(n-2)(n+1)$

$n=1$ $n=2$ $\leftarrow$ تعریف نشده

$D_f = (-\infty, \frac{2}{2}] - \{1\}$

۲

ب) $y = \frac{n+2}{n - \sqrt{2n-2}}$

$2n-2 \geq 0$ $n - \sqrt{2n-2} \neq 0$

$n > \frac{2}{2}$ $2n-2 \neq n^2$

$n^2 - 2n + 2 \neq 0$

$(n-1)(n-2) \neq 0$

$n=1$ $n=2$ $\leftarrow$

$D_f = [\frac{2}{2}, +\infty) - \{1, 2\}$

الف) $y = \frac{\sin x}{2\cos x - 1}$

$2\cos x - 1 \neq 0$

$\cos x \neq \frac{1}{2}$

$D_f = R - \left\{2k\pi + \frac{\pi}{3}, 2k\pi + \frac{5\pi}{3}\right\}$

ب) $y = \frac{\cos x + 1}{2\sin x + 1}$

$2\sin x + 1 \neq 0$

$\sin x \neq -\frac{1}{2}$

$D_f = R - \left\{k\pi + \frac{7\pi}{6}, k\pi + \frac{11\pi}{6}\right\}$

ج) $y = \frac{\tan x + 1}{\cot x - 1}$

$\cot x - 1 \neq 0$

$\cot x \neq 1$

$D_f = R - \left\{k\pi, k\pi + \frac{\pi}{4}, k\pi + \frac{5\pi}{4}\right\}$

د) $y = \frac{\sin x + 1}{2\sin x - 3}$

$2\sin x - 3 \neq 0$

$\sin x \neq \frac{3}{2}$

$\sin x = \frac{\sqrt{3}}{2}$

$D_f = R - \left\{k\pi + \frac{\pi}{3}, k\pi + \frac{2\pi}{3}\right\}$

۳

الف) $n^2 - 5n + 6 > 0$

$(n-3)(n-2) > 0$

$n=3$ $n=2$

$\frac{2}{3}$ $\frac{3}{2}$

$+$ $-$ $-$ $+$

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

ب) $n^2 - 8n + 15 < 0$

$(n-1)(n-5) < 0$

$n=1$ $n=5$

$\frac{1}{5}$ $\frac{5}{1}$

$+$ $-$ $-$ $+$

$D_f = (1, 5)$

ج) $n^2 + 6n + 8 \geq 0$

$(n+1)(n+8) \geq 0$

$n=-1$ $n=-8$

$\frac{-1}{-8}$ $\frac{-8}{-1}$

$+$ $-$ $-$ $+$

$D_f = (-\infty, -8] \cup [-1, +\infty)$

د) $n^2 - 7n + 12 \leq 0$

$(n-1)(n-6) \leq 0$

$n=1$ $n=6$

$\frac{1}{6}$ $\frac{6}{1}$

$+$ $-$ $-$ $+$

$D_f = [1, 6]$

۴

الف) $\frac{n^2 - 3n + 2}{n-5} < 0$

$\frac{1}{-1} \frac{2}{+1} \frac{5}{-1} \frac{5}{+1}$

$+$ $-$ $-$ $+$

تقریب

$\frac{(n-2)(n-1)}{n-5} < 0$

$n=2$ $n=1$ $n=5$

$D_f = (-\infty, 1) \cup (2, 5)$

ب) $\frac{n^2 - 1}{n^2 - 6n + 8} \geq 0$

$\frac{-1}{+1} \frac{1}{-1} \frac{2}{-1} \frac{4}{+1}$

$+$ $-$ $-$ $+$

تقریب

$D_f = (-\infty, 1] \cup (2, +\infty)$

۵

الف) $\sqrt{\frac{n^2 - 8n + 3}{n^2 - 1}}$

Sign chart for $\frac{n^2 - 8n + 3}{n^2 - 1}$:

+	-	-	+
0	1	3	∞

$\frac{n^2 - 8n + 3}{n^2 - 1} \geq 0$

Sign chart for $\frac{(n-3)(n-1)}{(n-1)(n+1)}$:

+	-	-	+
0	1	3	∞

$D_f = [3, +\infty)$

ب) $y = \sqrt{\frac{n^2 - 8n + 3}{n^2 - 1}}$

$n^2 - 1 \neq 0$
 $n^2 \neq 1$
 $n \neq \pm 1$

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

الف) $y = \log(n^2 - 3n)$

$n^2 - 3n > 0$
 $n(n-3) > 0$
 $n = 0$ $n = 3$

Sign chart for $\frac{n}{n-3}$:

+	-	+
0	3	∞

$D_f = (-\infty, 0) \cup (3, +\infty)$

ب) $y = \log \frac{1-n}{1-n^2}$

$1-n > 0$
 $-1 < n < 1$ $(-1, 1)$
 $1-n^2 > 0$ $|n| \neq 1$
 $n > 1$ $|n| \neq \pm 1$
 $n < -1$

$D_f = (-1, 1) \cup (1, +\infty) \cup (-\infty, -1)$

ج) $y = \log \frac{n^2 - 2n + 1}{n-3}$

$\frac{(n-1)^2}{n-3}$
 $1-n > 0$
 $n < 1$

$D_f = (-\infty, 1) - \{3\}$

د) $y = \sqrt{n^2 - 11n + 18} + 1$

$(n-9)(n-2) \geq 0$
 $n > 9$ $n < 2$
 $-9 < n < 2$

$D_f = (-9, 2] - \{1\}$

$y = \frac{n^2 - n}{n^2 + n} \Rightarrow \frac{n(n-1)}{n(n+1)}$

Sign chart for $\frac{n-1}{n+1}$:

+	-	-	+
0	1	-1	∞

Sign chart for $\frac{n^2 - n}{n^2 + n}$:

$n^2 - n$	+	+	-	+
$n^2 + n$	+	-	+	+
$P(n)$	+	-	-	+
	0	1	-1	∞

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

$\frac{n-f(n)}{f(n)} \geq 0$

Sign chart for $\frac{n-f(n)}{f(n)}$:

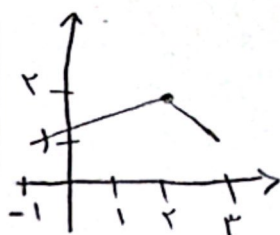
+	-	-	+	+
0	2	-1	2	3

Sign chart for $\frac{n-f(n)}{f(n)}$:

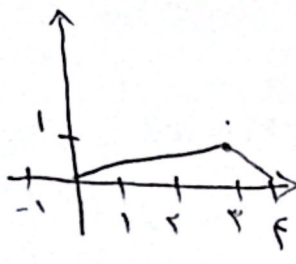
$n-f(n)$	-	-	+	+	-
$f(n)$	+	-	-	+	+
$P(n)$	-	+	-	+	-
	0	2	-1	2	3

$D_f = (-2, -1] \cup (2, 3]$

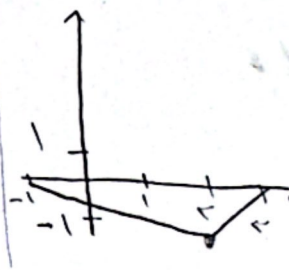
الف) $f(n) + 1 =$



ب) $f(n-1) =$



ج) $-f(n) =$



د) $f(n+1) + 2 =$

