

۱- این عبارت برای x مجسب است $\rightarrow$ رسیده $\rightarrow$ جمع ضرایب (الف)

$$\begin{array}{r|l} 4x^3 - 20x^2 + 31x - 15 & x-1 \\ \hline -4x^3 + 4x^2 & \\ \hline -16x^2 + 31x - 15 & \\ +16x^2 - 16x & \\ \hline 15x - 15 & \\ -15x + 15 & \\ \hline 0 & \end{array} \quad \begin{array}{l} x^2 - 16x + 60 \\ 16 + \sqrt{256 - 240} \rightarrow \frac{10}{4} = \frac{5}{2} \\ \frac{4}{4} = 1 \end{array}$$

رسیده $\leftarrow \frac{5}{2}, \frac{1}{4}, 1$

$Df = \mathbb{R} - \left\{1, \frac{5}{4}, \frac{1}{4}\right\}$

این عبارت برای $x+1$ مجسب است $\rightarrow$ رسیده $\rightarrow$ جمع ضرایب توان های زوج و فرد مساوی (ب)

$$\begin{array}{r|l} 3x^3 - x^2 - 11x - 4 & x+1 \\ \hline -3x^3 + 3x^2 & \\ \hline 4x^2 - 11x - 4 & \\ -4x^2 + 4x & \\ \hline -4x - 4 & \\ +4x + 4 & \\ \hline 0 & \end{array} \quad \begin{array}{l} x^2 - 4x - 12 \\ 4 + \sqrt{16 + 48} \rightarrow \frac{4}{3} = \frac{4}{3} \\ \frac{2}{3} \end{array}$$

رسیده $\leftarrow 2, -\frac{2}{3}, -1$

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

۲- الف $3 - 2x \geq 0 \rightarrow 3 \geq 2x \rightarrow \frac{3}{2} \geq x$

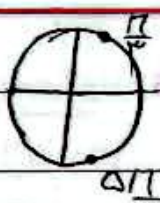
$$x - \sqrt{3 - 2x} \neq 0 \rightarrow x \neq \sqrt{3 - 2x} \rightarrow x^2 \neq 3 - 2x$$

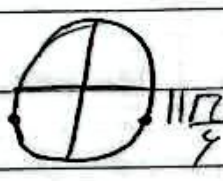
$$x^2 + 2x - 3 \neq 0 \rightarrow (x+3)(x-1) \neq 0 \rightarrow x \neq -3, 1$$

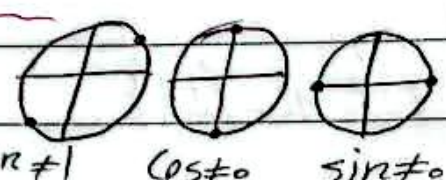
۱- مجموع صفرهای سود پس زائد است

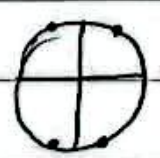
زنگنه $Df = (-\infty, \frac{3}{2}] - \{1\}$

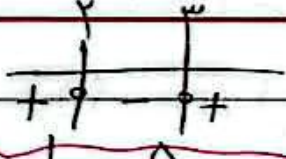
ب) $\sqrt{n-2} \geq 0 \rightarrow n \geq 2 \rightarrow n \geq \frac{1}{2}$
 $n - \sqrt{n-2} \neq 0 \rightarrow n \neq \sqrt{n-2} \rightarrow n^2 \neq n-2$
 $n^2 - n + 2 \neq 0 \rightarrow (n-2)(n-1) \neq 0 \rightarrow n \neq 1, 2$
 $Df = [\frac{1}{2}, +\infty) - \{1, 2\}$ ✓ محدود و بار صمغ

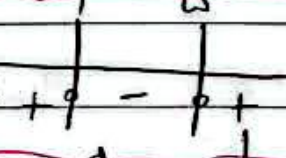
الف) $\sqrt{\cos n - 1} \neq 0 \rightarrow \cos n \neq 1$ -3
 $Df = \mathbb{R} - \{2k\pi + \frac{\pi}{2}, 2k\pi + \frac{3\pi}{2}\}$ 

ب) $\sqrt{\sin n + 1} \neq 0 \rightarrow \sin n \neq -1$
 $Df = \mathbb{R} - \{2k\pi + \frac{3\pi}{2}, 2k\pi + \frac{5\pi}{2}\}$ 

ج) $\cot n - 1 \neq 0 \rightarrow \frac{\cos n}{\sin n} \neq 1, \sin n \neq 0$
 $\tan n = \frac{\sin n}{\cos n} \rightarrow \cos n \neq 0$
 $Df = \mathbb{R} - \{k\pi, k\pi + \pi\}$ 

د) $\sqrt{\sin^2 n - 3} \neq 0 \rightarrow \sin^2 n \neq 3 \rightarrow \sin n \neq \pm \sqrt{3}$
 $Df = \mathbb{R} - \{k\pi + \frac{\pi}{3}, k\pi - \frac{\pi}{3}\}$ 

الف) $(n-2)(n-3) > 0$  $Df = (-\infty, 2) \cup (3, +\infty)$ -4

ب) $(n-5)(n-1) < 0$  $Df = (1, 5)$

ج) $(n+5)(n+1) \geq 0$  $Df = (-\infty, -5] \cup [-1, +\infty)$

د) $(n-1)(n-4) \leq 0$  $Df = [1, 4]$
نکته

الف $\frac{(x-1)(x-2)}{x-5} < 0$ -5

Sign chart: $\begin{array}{c|ccc} & 1 & 2 & 5 \\ \hline & - & + & - \\ \hline \end{array}$ $Df_2(-\infty, 1) \cup (2, 5)$

ب $\frac{(x-1)(x+1)}{(x-1)(x-5)} \geq 0$

Sign chart: $\begin{array}{c|ccc} & 1 & 5 \\ \hline & + & - \\ \hline \end{array}$ $Df_2(-\infty, -1] \cup (5, +\infty)$

الف $\frac{x^2-4x+3}{x^3-1} \geq 0 \Rightarrow \frac{(x-1)(x-3)}{(x-1)(x^2+x+1)}$ -6

Sign chart: $\begin{array}{c|c} & 3 \\ \hline & - \\ \hline \end{array}$ $Df_2[3, +\infty)$

همواره مثبت $\Rightarrow$ مناسب

ب $\frac{x^2-1}{x^3-1} \neq 0 \Rightarrow (x-1)(x+1) \neq 0$

$x \neq \pm 1$ ✓

$Df_2 \mathbb{R} - \{\pm 1\}$

الف $x^2-3x > 0 \Rightarrow x(x-3) > 0$ -7

Sign chart: $\begin{array}{c|cc} & 0 & 3 \\ \hline & + & - \\ \hline \end{array}$ $Df_2(-\infty, 0) \cup (3, +\infty)$

ب $|9-x^2| > 0 \Rightarrow 9 > x^2 \Rightarrow -3 < x < 3, |x|-2 > 0 \Rightarrow |x| > 2$

$|x|-2 \neq 1 \Rightarrow |x| \neq 3 \Rightarrow x \neq \pm 3$ $x > 2, x < -2$ ✓

$Df_2(-3, -2) \cup (2, 3) - \{\pm 3\}$

ج $\frac{x^2-7x+12}{x-3} > 0 \Rightarrow \frac{(x-3)(x-4)}{x-3} > 0 \Rightarrow x-4 > 0$

Sign chart: $\begin{array}{c|c} & 4 \\ \hline & - \\ \hline \end{array}$

$10-x > 0 \Rightarrow 10 > x, 10-x \neq 1 \Rightarrow 9 \neq x, Df_2(9, 10) - \{9\}$

د $x^2-11x+28 > 0 \Rightarrow (x-4)(x-7) > 0$

Sign chart: $\begin{array}{c|cc} & 4 & 7 \\ \hline & + & - \\ \hline \end{array}$

$\sqrt{36-x^2} > 0, x \neq 1 \Rightarrow 36-x^2 > 0 \Rightarrow 36 > x^2 \Rightarrow -6 < x < 6$

ه $Df_2(0, 4] - \{1\}$

$\frac{n^2-n}{n^2+n}$ رولس سریع $\rightarrow \frac{n(n-1)}{n(n+1)}$

-	0	1	2	3
+	-	-	-	+

-1

رولس کبارتانی $\rightarrow$

n^2-n	+	+	0	-	0	+
n^2+n	+	-	-	+	+	+
y	+	-	-	-	0	+

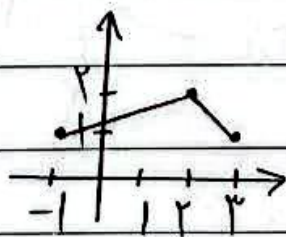
$n-f(n) \geq 0 \rightarrow \lim_{n \rightarrow \infty} n-f(n) = 0 \rightarrow n=f(n) \rightarrow n=3, -1$

$f(n) \rightarrow \lim_{n \rightarrow \infty} f(n) = 0 \rightarrow n=\pm 2$

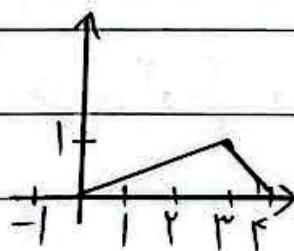
-2	-1	2	3
-	+	-	+

$Df = (-2, -1] \cup [2, 3]$

الف)



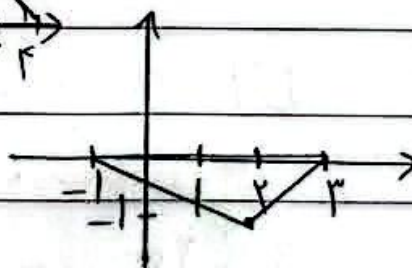
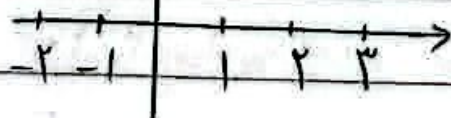
ب)



ج)



د)



-10