

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

$$\begin{array}{r|l}
 4x^3 - 20x^2 + 31x - 15 & x-1 \\
 \hline
 -4x^3 + 4x^2 & \\
 \hline
 -16x^2 + 31x - 15 & \\
 +16x^2 - 16x & \\
 \hline
 15x - 15 & \\
 -15x + 15 & \\
 \hline
 0 &
 \end{array}
 \quad
 \begin{array}{l}
 x^2 - 14x + 60 \\
 14 + \sqrt{196 - 240} \rightarrow \frac{10}{4} = \frac{5}{2} \\
 \frac{10}{4} = \frac{5}{2} \\
 \frac{6}{4} = \frac{3}{2} \\
 \text{رسیده} \leftarrow \frac{5}{4}, \frac{1}{4}, 1
 \end{array}$$

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

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

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

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

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

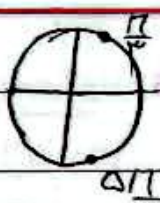
$$x - \sqrt{3 - 2x} \neq 0 \rightarrow x \neq \sqrt{3 - 2x} \rightarrow x^2 \neq 3 - 2x$$

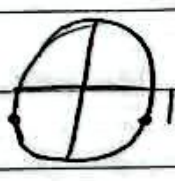
$$x^2 + 2x - 3 \neq 0 \rightarrow (x+3)(x-1) \neq 0 \rightarrow x \neq -3, 1$$

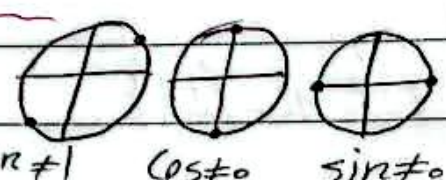
۱- ۳- مجموع صفرهای سود پس زائد است

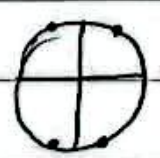
$$Df = (-\infty, \frac{3}{2}] - \{1\}$$

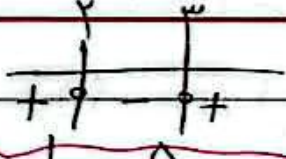
ب) $\sqrt{x-2} \geq 0 \rightarrow x \geq 2 \rightarrow x \geq \frac{1}{2}$
 $x - \sqrt{x-2} \neq 0 \rightarrow x \neq \sqrt{x-2} \rightarrow x^2 \neq x-2$
 $x^2 - x + 2 \neq 0 \rightarrow (x-2)(x-1) \neq 0 \rightarrow x \neq 1, 2$
 $Df = [\frac{1}{2}, +\infty) - \{1, 2\}$ ✓ محدود و بار صمغ

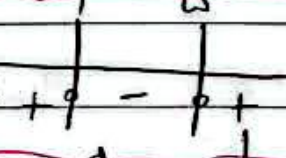
الف) $\sqrt{\cos x} - 1 \neq 0 \rightarrow \cos x \neq 1$ -3
 $Df = \mathbb{R} - \{2k\pi + \frac{\pi}{2}, 2k\pi + \frac{3\pi}{2}\}$ 

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

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

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

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

ب) $(x-5)(x-1) < 0$  $Df = (1, 5)$

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

د) $(x-1)(x-4) \leq 0$  $Df = [1, 4]$
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 $x^2-1 \neq 0 \Rightarrow (x-1)(x+1) \neq 0$

$x \neq \pm 1$ ✓

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

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 $\rightarrow \frac{n(n-1)}{n(n+1)}$

-1	0	1
+	-	+

-1

رولس کبارتانی $\rightarrow$

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

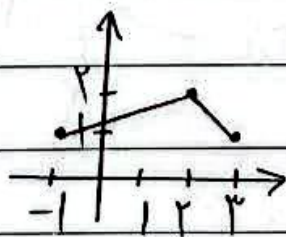
$n-f(n) \geq 0 \rightarrow \lim_{n \rightarrow \infty} n-f(n) = 0 \rightarrow n=f(n) \rightarrow n=3, -1$

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

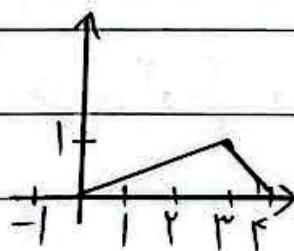
-2	-1	2	3
-	+	-	+

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

الف)



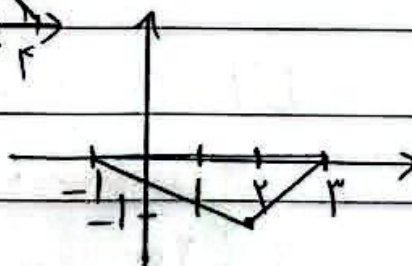
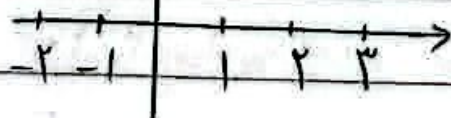
ب)



ج)



د)



-10