

الف) $y = \frac{n+2}{4n^3 - 20n^2 + 31n - 15}$ جمع ضرایب $4n^3 - 20n^2 + 31n - 15$ صفر است $-4n^3 + 4n^3$ پس عبارت $| \frac{n-1}{4n^2 - 14n + 15} |$ (۱)

خارج بر ۱-۲۰ ضعیف پذیر است $-14n^2 + 31n + 15$ ۲
 $+14n^2 - 14n$
 $15n - 15$
 $-15n + 15$
 0

$\Rightarrow \frac{n+2}{(n-1)(4n^2 - 14n + 15)} = \frac{n+2}{(n-1)(2n-5)(2n-3)}$

$\Rightarrow (n-1)(2n-5)(2n-3) \neq 0$
 $n-1 \neq 0 \rightarrow \boxed{n \neq 1}$
 $2n-5 \neq 0 \rightarrow \boxed{n \neq \frac{5}{2}}$
 $2n-3 \neq 0 \rightarrow \boxed{n \neq \frac{3}{2}}$

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

ب) $y = \frac{n+3}{3n^3 - n^2 - 11n - 4}$

جمع ضرایب توان های فرد و زوج با هم برابر است پس عبارت مجزئ
۱+۳ ضعیف پذیر است

$3n^3 - n^2 - 11n - 4$ ۱ $| \frac{n+1}{3n^2 - 4n - 4} |$
 $-3n^3 + 3n^2$
 $-4n^2 - 11n - 4$
 $+4n^2 + 4n$
 $-7n - 4$
 $+7n + 7$
 0

ریشه این عبارت
از راه دلتا

$\frac{n+3}{(n+1)(3n^2 - 4n - 4)}$

$(n+1)(3n^2 - 4n - 4) \neq 0$

$n+1 \neq 0 \rightarrow \boxed{n \neq -1}$

$\Delta = b^2 - 4ac$

$\Delta = 16 - 4(-4 \times 3)$

$\Delta = 16 + 48 = 64$

$n = \frac{-b \pm \sqrt{\Delta}}{2a} \Rightarrow \frac{4 \pm 8}{4} \Rightarrow$

$n \neq 2$ و $n \neq -\frac{2}{3}$ چون در مخرج هستند باید مخالف صفر باشند پس $\boxed{n = 2}$ $\boxed{n = -\frac{2}{3}}$

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

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الف) $y = \frac{x+1}{x-\sqrt{r-rx}}$
 $0, \infty$

$$x - \sqrt{r-rx} \neq 0$$

$$(x)^r \neq (\sqrt{r-rx})^r$$

$$x^r \neq r-rx$$

$$x^r + rx - r \neq 0$$

$$(x+r)(x-1) \neq 0 \rightarrow \begin{cases} x+r \neq 0 \rightarrow \boxed{x \neq -r} \\ x-1 \neq 0 \rightarrow \boxed{x \neq 1} \end{cases}$$

$$\sqrt{r-rx} \rightarrow r-rx \geq 0 \rightarrow \boxed{x \leq \frac{r}{r}}$$

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

$$x = -r \rightarrow y = \frac{-r}{-4} = \frac{1}{r}$$

1, ∞

ب) $y = \frac{x+r}{x-\sqrt{r-rx}}$

$$x - \sqrt{r-rx} \neq 0$$

$$x \neq \sqrt{r-rx}$$

$$x^r \neq r-rx$$

$$\sqrt{r-rx} \rightarrow r-rx \geq 0$$

$$\boxed{x \geq \frac{r}{r}}$$

$$x^r - rx + r \neq 0$$

$$(x-1)(x-r) \neq 0 \rightarrow \begin{cases} x-1 \neq 0 \rightarrow \boxed{x \neq 1} \\ x-r \neq 0 \rightarrow \boxed{x \neq r} \end{cases}$$

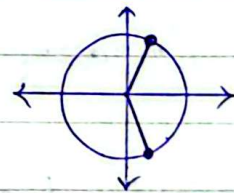
$$D_f = [\frac{r}{r}, +\infty) - \{1, r\}$$

ج) $y = \frac{\sin u}{r \cos u - 1}$

$$r \cos u - 1 \neq 0$$

$$\cos u \neq \frac{1}{r}$$

$$D_f = \mathbb{R} - \{r k \pi \pm \frac{\pi}{r}\}$$



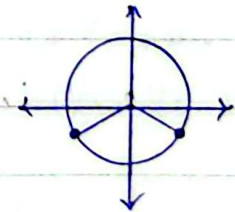
(r)

د) $y = \frac{\cos u + 1}{r \sin u + 1}$

$$r \sin u + 1 \neq 0$$

$$\sin u \neq -\frac{1}{r}$$

$$D_f = \mathbb{R} - \{r k \pi + \frac{\pi}{r}, r k \pi - \frac{\pi}{r}\}$$



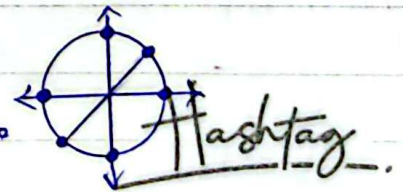
ه) $y = \frac{\tan u + r}{\cot u - 1}$

$$\cot u - 1 \neq 0 \rightarrow \cot u \neq 1$$

$$\cot u = \frac{\cos u}{\sin u} \rightarrow \sin u \neq 0$$

$$\tan u = \frac{\sin u}{\cos u} \rightarrow \cos u \neq 0$$

$$D_f = \mathbb{R} - \{\frac{k\pi}{r}, k\pi + \frac{\pi}{r}\}$$



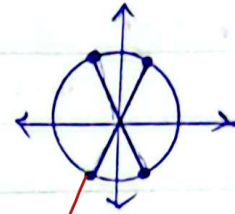
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$$y = \frac{\sin x + 1}{\sin^2 x - 1}$$

$$\sin^2 x - 1 \neq 0$$

$$\sin^2 x \neq 1$$

$$\sin x \neq \pm \frac{\sqrt{1}}{1}$$

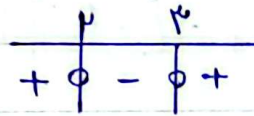


$$D_f = \mathbb{R} - \left\{ 2k\pi + \frac{\pi}{2}, 2k\pi + \frac{3\pi}{2}, 2k\pi + \frac{5\pi}{2}, 2k\pi + \frac{7\pi}{2} \right\}$$

$$a) x^2 - 5x + 4 > 0$$

$$(x-1)(x-4) > 0$$

$$\begin{cases} x > 4 \\ x > 1 \end{cases}$$



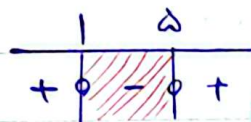
(K)
2

$$D_f = (-\infty, 1) \cup (4, +\infty)$$

$$b) x^2 - 9x + 5 < 0$$

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

$$\begin{cases} x < 1 \\ x < 5 \end{cases}$$



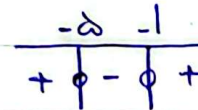
چون گفته کمتر از صفر
مازهی منفی را انتخاب می کنیم

$$D_f = (1, 5)$$

$$c) x^2 + 4x + 5 \geq 0$$

$$(x+1)(x+5) \geq 0$$

$$\begin{cases} x \geq -1 \\ x \geq -5 \end{cases}$$

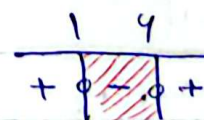


$$D_f = (-\infty, -5] \cup [-1, +\infty)$$

$$d) x^2 - 5x + 4 \leq 0$$

$$(x-1)(x-4) \leq 0$$

$$\begin{cases} x \leq 1 \\ x \leq 4 \end{cases}$$



چون گفته کمتر یا مساوی
صفر، مازهی مثبت
را انتخاب می کنیم

$$D_f = [1, 4]$$

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$$\text{الف) } y = \frac{x^2 - 3x + 2}{x - 5} < 0$$

$$\begin{array}{c|c|c|c} 1 & 2 & 5 & \\ \hline - & + & - & + \end{array}$$

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

$$\frac{(x-1)(x-2)}{x-5} < 0 \rightarrow \begin{cases} x < 1 \\ x < 2 \end{cases}$$

$$x-5 \neq 0 \rightarrow x \neq 5$$

2

$$\text{ب) } y = \frac{x^2 - 1}{x^2 - 4x + 5} \geq 0$$

$$\begin{array}{c|c|c|c} -1 & & 5 & \\ \hline + & - & - & + \end{array}$$

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

$$\frac{(x-1)(x+1)}{(x-1)(x-5)} \geq 0 \rightarrow \begin{cases} x \geq 1 \\ x \geq -1 \end{cases}$$

$$\left\{ \begin{array}{l} x \geq 1 \\ x \geq 5 \end{array} \right\} \rightarrow x \geq 5$$

$$\text{الف) } y = \sqrt{\frac{x^2 - 4x + 3}{x^2 - 1}}$$

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

مخرج + است

چون دلتای آن منفی می شود

$$\Delta = b^2 - 4ac$$

$$\Delta = 1 - 4 = -3$$

$$\begin{array}{c|c|c|c} 1^* & 3 & & \\ \hline - & - & - & + \end{array}$$

$$D_f = [3, +\infty)$$

بیشتر
در صورت
مخرج

$$x \geq 1, x \geq 3$$

$$x-1 > 0 \rightarrow x > 1$$

$$\text{ب) } y = \sqrt{\frac{x^2 - 4x + 3}{x^2 - 1}}$$

چون فرجه را در یکال 3 است محدودیت فقط در مخرج داریم

$$x^2 - 1 \neq 0$$

$$(x-1)(x+1) \neq 0$$

$$x \neq \pm 1$$

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

الف) $y = \log(x^2 - 3x)$

$$\begin{aligned} x^2 - 3x &> 0 \\ x(x-3) &> 0 \\ x > 0 \quad x > 3 \end{aligned}$$

$$\begin{array}{c} 0 \quad 3 \\ + \quad - \quad + \end{array}$$

(V)
1, V, 3

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

ب) $\log_{|x|-2} 14-x^2$

$$14 - x^2 > 0 \rightarrow 14 > x^2 \rightarrow x^2 < 14$$

$-4 < x < 4$

$|x|-2 > 0 \rightarrow |x| > 2$

$x > 2 \quad x < -2$

$D_f = (-4, -2) \cup (-2, -2) \cup (2, 4) \cup (4, 4)$

$|x|-2 \neq 1 \rightarrow x-2 \neq 1$

$x \neq 3$

$-x-2 \neq 1 \rightarrow x \neq -3$

ج) $\log_{10-x} \frac{x^2 - 5x + 4}{x-3}$

$$\frac{x^2 - 5x + 4}{x-3} > 0$$

$$\frac{(x-3)(x-4)}{x-3} > 0$$

$10-x > 0 \rightarrow x < 10$

$x > 3 \quad \cap \quad x > 4 \quad x > 4$

$10-x \neq 1 \rightarrow x \neq 9$

$D_f = (3, 9) \cup (9, 10)$

د) $y = \sqrt{x^2 - 11x + 28} + \log_4 \sqrt{44-x^2}$

$x^2 - 11x + 28 \geq 0$

$(x-4)(x-7) \geq 0 \quad x \geq 4 \quad x \leq 7$

~~$x \geq 4 \quad x \geq 7$~~

$\sqrt{44-x^2} > 0$

$44 > x^2 \rightarrow x^2 < 44$

$-6.6 < x < 6.6$

$x > 0$

$x \neq 1$

$$\begin{array}{c} -4 \quad 0 \quad 1 \quad 4 \quad 7 \quad \sqrt{44} \\ - \quad + \quad - \quad + \quad - \quad + \quad - \end{array}$$

~~$D_f = (-4, 0) \cup (1, 4] \cup (4, \sqrt{44})$~~

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

(1)

$$\frac{-1}{+} \frac{0}{-} \frac{1}{+} \quad \text{دوش سرخ}$$

	-1	0	1
$n^2 - n$	+	+	-
$n^2 + n$	+	-	+
$p(n)$	+	-	+

دوش آبیاری

(2)

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

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

$$n - f(n) = 0$$

(9)

$$n = f(n)$$

$$f(n) = 0$$

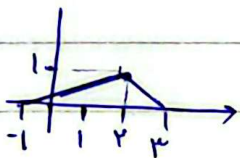
$$f(n) = -2, 2$$

$$n = -1, 3$$

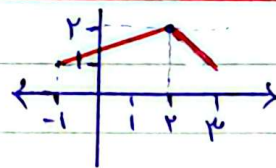
	-2	-1	2	3
$n - f(n)$	-	-	+	+
$f(n)$	+	-	-	+
p	-	+	-	+

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

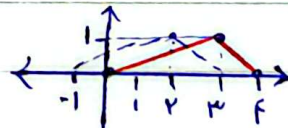
باران



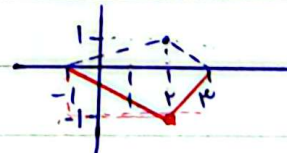
f(n) + 1



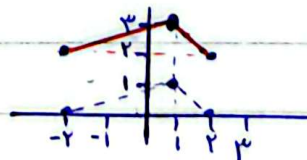
f(n-1)



-f(n)



f(n+1) + 2



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