

نام و نام خانوادگی: مسعود دهرخانی

شماره تلفن: ۳

تاریخ: یازدهم دی ماه

الف) $y = \frac{x+3}{x^2+x^2-11x+3} =$

$(x-1)(x^2+2x-3) \rightarrow (x-1)(x+3)(x-1)$
 $(x-1) \downarrow \rightarrow x^2+2x-3 \Rightarrow (x-1)(x+3)$

ب) $y = \frac{x+3}{x^2+9x^2+10x+3} \neq 0$

$(x-1)(x^2+9x+3) \rightarrow (x+1)(x+3)$
 $(x-1) \downarrow \rightarrow x^2+9x+3 \Rightarrow (x+1)(x+3)$

$D_f = \mathbb{R} - \{-3, 1, 1\}$

$\frac{-x^2+11}{x^2+3} \mid \frac{x-1}{x}$
 $\frac{-x^2+11}{x^2+3} \mid \frac{x-1}{x}$

باقیه جمع ضرایب کسری = 0 پس در $x-1$ چنانچه بقیه نیست.
 $\frac{x^2+3}{x^2+3} \mid \frac{x-1}{x^2+3}$
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$D_f = \mathbb{R} - \{-3, -1, 1\}$

$\frac{x^2+3}{x^2+3} \mid \frac{x+1}{x}$
 $\frac{x^2+3}{x^2+3} \mid \frac{x+1}{x}$

جمع ضرایب توان فرد = جمع ضرایب توان زوج
 $\frac{x^2+9x^2+10x+3}{x^2+3} \mid \frac{x+1}{x^2+3}$
 $\frac{x^2+9x^2+10x+3}{x^2+3} \mid \frac{x+1}{x^2+3}$
 $\frac{x^2+9x^2+10x+3}{x^2+3} \mid \frac{x+1}{x^2+3}$

الف) $y = \frac{x+3}{x^2-x^2+x-1} \neq 0$

$(x-1)(x^2-x+1)$
 $(x-1) \downarrow \rightarrow x^2-x+1 \Rightarrow (x-1)(x+1)$

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

$(x-1)(x^2-x+1)$
 $(x-1) \downarrow \rightarrow x^2-x+1 \Rightarrow (x-1)(x+1)$
 $D_f = (-\infty, -3] \cup (1, +\infty)$

باقیه جمع ضرایب کسری = 0 پس در $x-1$ چنانچه بقیه نیست.
 $\frac{x^2-x^2+x-1}{x^2-x^2+x-1} \mid \frac{x-1}{x^2-x^2+x-1}$
 $\frac{x^2-x^2+x-1}{x^2-x^2+x-1} \mid \frac{x-1}{x^2-x^2+x-1}$

$\Delta = 1 - (f(x) \mid x)$
 $\Delta = -3 < 0$
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(1) $\rightarrow \Delta \rightarrow + \infty$

$$y = \frac{r}{x^2 - a|x-1| - rx + a} \quad (\text{I}) \quad x > 1 \rightarrow x^2 - ax + a - rx + a \Rightarrow x^2 - (r+a)x + 2a \neq 0$$

$$\textcircled{P} \quad (x-r)(x-a) \neq 0$$

$$(\text{II}) \quad x < 1 \rightarrow x^2 - a + ax - rx + a \rightarrow x^2 + (a-r)x \neq 0 \rightarrow x(x+r) \neq 0$$

$$\textcircled{O} \quad \textcircled{-r}$$

$$D_f = \mathbb{R} - \{r, a, -r, 0\}$$

$$\text{الف) } \frac{x+r}{|rx+1| - |x+r|} \neq 0 \quad D_f = \mathbb{R} - \{-\frac{r}{x}, r\}$$

$$|rx+1| + |x+r| \rightarrow \begin{cases} rx+1 \neq x+r \rightarrow x \neq r \\ rx+1 \neq -x-r \rightarrow rx \neq -x-r \rightarrow x \neq -\frac{r}{x} \end{cases}$$

$$\text{ب) } y = \sqrt{|rx+1| - |x+r|}$$

$$|rx+1| \geq |x+r| \xrightarrow{\text{I} \text{ or } \text{II}} \begin{cases} rx+1 + rx \geq x+r, & x^2 + r + rx \geq x+r \\ rx+1 - rx \geq -x-r \end{cases} \quad \textcircled{r} \quad \textcircled{-\frac{r}{x}}$$

$$x^2 - rx - r \geq 0 \rightarrow (x-r)(x+r) \geq 0 \quad D_f = (-\infty, -\frac{r}{x}] \cup [r, +\infty)$$

$$\text{الف) } y = \log_r(1 - \log_{\frac{r}{x}}) \quad D_f = (-\infty, r)$$

$$1 - \log_{\frac{r}{x}} > 0 \rightarrow 1 > \log_{\frac{r}{x}} \Rightarrow \boxed{x < r}$$

$$\text{ب) } y = \log_r(1 - \log_{\frac{r}{x}})$$

$$1 - \log_{\frac{r}{x}} > 0 \rightarrow 1 > \log_{\frac{r}{x}} \rightarrow x < \frac{1}{r} \rightarrow x > \frac{1}{r} \quad D_f = (\frac{1}{r}, +\infty)$$

$$f(x) = \sqrt{\log_{\omega} \log_{\omega} (x-1)} \geq 0 \quad (I) \quad x-1 > 0 \rightarrow x > 1 \rightarrow x > \frac{1}{4}$$

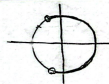
$$(II) \quad \log_{\omega} (x-1) > 0 \rightarrow x-1 > 1 \rightarrow x > 2 \rightarrow x > 1$$

$$(III) \quad \log_{\frac{1}{4}} \log_{\omega} (x-1) \geq 0 \rightarrow \log_{\omega} (x-1) \geq 1 \xrightarrow{0 < b < 1} \log_{\omega} (x-1) \leq 1 \rightarrow x-1 \leq \omega \rightarrow x \leq 4$$

$$(I) \cap (II) \cap (III) \rightarrow \text{Number line diagram with points } \frac{1}{4}, 1, 4 \text{ and interval } D_f = [3, +\infty)$$

$$(a) \quad y = \log(x \cos x + 1) \rightarrow x \cos x + 1 > 0 \rightarrow \cos x > -\frac{1}{x}$$

$$D_f = \left(xk\pi - \frac{\pi}{\omega}, xk\pi + \frac{\pi}{\omega}\right)$$



$$(b) \quad y = \sqrt{\log \frac{x-1}{x+1}} \geq 0 \quad (I) \quad \frac{x-1}{x+1} > 0 \rightarrow \frac{1}{x+1} > 0 \rightarrow (-\infty, -1) \cup (1, +\infty)$$

$$(II) \quad \log \frac{x-1}{x+1} \geq 0 \rightarrow \frac{x-1}{x+1} \geq 1 \rightarrow \frac{x-1}{x+1} - 1 \geq 0 \rightarrow \frac{x-1-x-1}{x+1} \geq 0 \rightarrow \frac{-2}{x+1} \geq 0 \rightarrow x < -1$$

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

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تبع $f(x) = \sqrt{(x+2)x^2 + ax + b}$ در بازه $(-\infty, 1]$ مقادیر a و b ؟

$$-1x + b \geq 0 \rightarrow x \leq \frac{b}{1}$$

تبع $f(x)$ در بازه $(-\infty, 1]$ مقادیر a و b ؟

$$\frac{b}{1} = 1 \rightarrow \underline{b = 1}$$

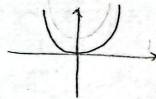
* اگر تابع $f(x)$ در بازه $(-\infty, 1]$ مقادیر a و b ؟
 در $x = 1$ تابع $f(x)$ به 0 می رسد.
 در $x = -2$ تابع $f(x)$ به 0 می رسد.

اگر تابع $f(x) = \sqrt{x^2 + 12x + 1 - m^2}$ در بازه $(-\infty, 1]$ مقادیر m ؟

$$\Delta \leq 0 \rightarrow b^2 - 4ac \leq 0 \rightarrow 12^2 - 4(1)(1 - m^2) \leq 0$$

$$144 - 4(1 - m^2) \leq 0 \rightarrow -4 + 4m^2 \leq 0 \rightarrow 4(-1 + m^2) \leq 0$$

$$m^2 \leq 1 \rightarrow (-1) \leq m \leq (1) \quad +1 - (-1) = (2)$$



اگر تابع $f(x) = \frac{\sqrt{x^2 - 1}}{[x] + [-x] + 1} \neq 0$ در بازه $(-\infty, 1]$ مقادیر x ؟

$$(I) \quad x^2 - 1 \geq 0 \rightarrow x \geq 1 \rightarrow -x \leq -1$$

$$(II) \quad [x] + [-x] \neq -1 \rightarrow \begin{cases} 0 & x \in \mathbb{Z} \checkmark \\ -1 & x \notin \mathbb{Z} \end{cases} \rightarrow (\mathbb{Z})$$

$$(I) \cap (II) \Rightarrow$$

$$D_f = \{-1, 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100\}$$

$$\{-4, -3, -2, -1, 0, 1, 2, 3, 4\}$$

$$\mathbb{Z} \setminus \{0\}$$