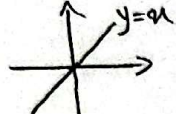


(1) الف) $y''' - 2y'' = 2y - 1$ $y''' = 2y'' + 2y - 1$ $\frac{y_1 = y_2}{y_1' = y_2'} \rightarrow y_1' = y_2' \rightarrow y_1 = y_2$ تابع است

ب) $y = \frac{\pi}{p} \rightarrow \frac{\pi}{p} \cos y = 0$ y می تواند هر چیزی باشد پس تابع نیست

ج) $\frac{y+y}{p} = \sqrt{xy}$ $\frac{y'' + y' + 2xy}{p} = xy$ $y'' + y' + 2xy - 2xy = 0$ $y'' - 2xy + y' = 0$ $(y-y)'' = 0$

$y = y$  تابع است

د) $xy'' + 2y - y'' - 2y = 0$ $y'' + 2y - xy'' - 2y = 0$ $y(y'' + 2) - x(y'' + 2) = 0$ $(y'' + 2)(y - x) = 0$ همواره مثبت

(2) $|x-1| \geq 2 \rightarrow \begin{cases} x-1 \geq 2 & x \geq 3 \\ x-1 \leq -2 & x \leq -1 \end{cases}$ $x = -1 \rightarrow 2x' - b = a + 2x$ $2 - b = a - 2$ $a + b = 4$

(3) x^2 ضرب $\rightarrow \frac{b}{-p} \frac{a}{-p} \rightarrow b + a = \frac{-(-b)}{-1} = -b$ $ab = -a \rightarrow b = -1$ $-1 + a = 1$ $a = 2$ $a + b = 2 + (-1) = 1$

(4) $D_f = (-\infty, 2) \rightarrow$ است $ax'' + bx' + c$ $a = 0$ $b < 0$ $\frac{c}{b} = 2$ $c = -2b$

$3a + c - 3|b| = 3(0) + (-2b) - 3(-b) = b$

(5) الف) $|x| \neq [x]$ $D_f = \mathbb{R}^- = (-\infty, 0)$

ب) $f(x) = \sqrt{x} + \sqrt{y} = 9$ $x_{\min} = 0$ $x_{\max} = 81$ $0 \leq x \leq 81$ $D_f = [0, 81]$

(6) الف) $f(x) = \sqrt{\log_{x-1} x}$ $x-1 > 0$ $x > \frac{1}{p}$ $x > 0$ $\log_{x-1} x \geq 0$ $x-1 \geq 1$ $x \geq \frac{p}{p}$ $I \cap II \cap III \rightarrow D_f = [\frac{p}{p}, +\infty) - \{1\}$

ب) $f(x) = \log \frac{1}{9 + \sqrt{12x} - 12x}$ $9 + \sqrt{12x} - 12x > 0$ $\sqrt{12x} = t \rightarrow -t^2 + t + 9 > 0$

$t^2 - t - 9 < 0$ $\frac{-1 \pm \sqrt{1+36}}{2} = \frac{-1 \pm \sqrt{37}}{2}$ $\sqrt{12x} \in (-\frac{1+\sqrt{37}}{2}, \frac{-1+\sqrt{37}}{2})$ $\frac{\sqrt{12x}}{2} > 0$ $0 < \sqrt{12x} < \frac{-1+\sqrt{37}}{2}$ $0 < |x| < 9 \rightarrow \begin{cases} x \neq 0 \\ -\frac{1}{3} < x < \frac{1}{3} \end{cases}$ $D_f = (-\frac{1}{3}, \frac{1}{3}) - \{0\}$

(7) $y = \sqrt{\frac{3x+2+ax+ab}{x+b}}$ $\frac{3x+2+ax+ab}{x+b} \geq 0$ $\frac{x(3+a)+ab+2}{x+b} \geq 0$

$D_f = (2, +\infty) \rightarrow b+2=0$ $b=-2$

$a+3=0$ $a=-3$

چون یک ریشه داریم پس صورت نباید ریشه داشته باشد پس:

(8) $y = \sqrt{f(x) - x + 1}$ $f(x) \geq x - 1 \rightarrow \begin{cases} 2x-1 \geq x-1 & x \geq 0 \text{ I } [x] > 4 \rightarrow x \geq 5 \text{ II} \\ 3x+3 \geq x-1 & x \geq -\frac{2}{p} \text{ III } [x] \leq 4 \rightarrow x \leq 4 \text{ IV} \end{cases}$ $I \cap II \rightarrow x \geq 5$ $III \cap IV \rightarrow -\frac{2}{p} \leq x \leq 4$ $\frac{-2}{p} \leq x$ $D_f = [-\frac{2}{p}, +\infty)$

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$$y = \frac{r^3(12x^r + 12x^r + 9x+1)}{((x+1)^r)^2} = \frac{r^3(x+1)^r}{(x+1)^2} = \frac{r^3}{x+1}$$

$$x+1 \neq 0 \quad x \neq -\frac{1}{r}$$

(9)

$$D_f = \mathbb{R} - \left\{-\frac{1}{r}\right\}$$

$$y = \sqrt{1 - \log^{r_1} x - a}$$

$$r_1 - a > 0 \quad x > \frac{a}{r}$$

$$\log^{r_1} x - a \leq 1$$

$$r_1 - a \leq 10$$

$$x \leq \frac{10+a}{r}$$

(10)

$$\underbrace{\frac{a}{r}}_b < x \leq \underbrace{\frac{10+a}{r}}_c$$

$$c - b = \frac{10+a}{r} - \frac{a}{r} = \frac{10}{r} = \omega$$