

$$f(x) = \left(\frac{1}{x}\right)^{n-1} - 1 \quad y = \sqrt{x^n f(n+1)} \rightarrow D_f = ?$$

$$\Rightarrow x^n x^{f(n+1)} \geq 0 \rightarrow x^n \left(\left(\frac{1}{x}\right)^{n-1} - 1\right) \geq 0 \Rightarrow \frac{1}{-x + x} =$$

$$\Rightarrow D_f = [0, 1] \quad \checkmark$$

$$f(x) = \sqrt{x + |x+2|} \quad f(-x) \rightarrow D_f = ?$$

$$f(-x) = \sqrt{-x + |-x+2|} \rightarrow -x + |-x+2| \geq 0 \quad \begin{cases} -x + x + 2 & x \geq 2 \\ -x - x + 2 & x < 2 \end{cases}$$

$$\Rightarrow \begin{cases} 2 & x \geq 2 \\ -2x + 2 & x < 2 \end{cases} \rightarrow -2x + 2 \geq 0 \rightarrow -2x \geq -2 \rightarrow x \leq 1 \Rightarrow D_f = (-\infty, 1] \quad \checkmark$$

$$y = \sqrt{\frac{x-1}{f(x)}} \rightarrow \frac{x-1}{f(x)} \geq 0 \quad \text{for } \begin{cases} x=1 \rightarrow y=0 \\ x=2 \rightarrow y=0 \\ x=3 \rightarrow y=0 \end{cases}$$

$$\Rightarrow \frac{1}{-x+2} \geq 0 \rightarrow D_f = (-\infty, 1] \cup (2, 3) \quad \checkmark$$

$$y_1 = \frac{1}{9x^2 - 4x^2 - 4x - 3} \quad y_2 = \frac{1}{10x^2 + 4x + 3}$$

$$\Rightarrow 9x^2 - 4x^2 - 4x - 3 = (3x^2 + mx + n)(3x^2 + kx + p) = 9x^2 + 3mx^2 + 3px^2 + mnx + mpn + 3nx^2 + nkx + np$$

پاسخ نه روستی جدول

$3x^2 + x + 1 \rightarrow \Delta < 0$

$a = -1$
 $b = -3$

جواب ۲

$$f(x) = x^3 + x \quad y = \sqrt{f(x) - f\left(\frac{x}{2}\right)} \rightarrow x^3 + x - \left(\frac{x^3}{8} + \frac{x}{2}\right) = \frac{x^3 + 2x^3 - x^3 - 4x}{8} = \frac{x^3 - 4x}{8}$$

$$\rightarrow \frac{(x^2 - 4)(x^2 + 4x + 4)}{8} \geq 0 \rightarrow \frac{1}{-x+2} \geq 0 \rightarrow D_f = [-2, 0) \cup [2, +\infty) \quad \checkmark$$

$$f(x^3+x) = |x^3-1| \quad f(1)+f(10)=?$$

$$x^3+x=10 \rightarrow x^3+x-10=0 \xrightarrow{x(1)+1-10=0} x=1 \rightarrow f(10)=|1^3-1|=0$$

$$x^3+x=1 \rightarrow x^3+x-1=0 \xrightarrow{x(1)+1-1=0} x=1 \rightarrow f(1)=|1^3-1|=0$$

(2)

$$f(x)=x^3-7x^2+12x \quad g(x)=x^3+9x^2+12x \quad \frac{g(\sqrt[3]{17}-1)}{f(\sqrt[3]{17}+1)}=?$$

$$g(x)=(x+3)^3-12 \rightarrow g(\sqrt[3]{17}-1)=(\sqrt[3]{17})^3-12=5$$

$$f(x)=(x-2)^3+12 \rightarrow f(\sqrt[3]{17}+1)=(\sqrt[3]{17})^3+12=17$$

$$\rightarrow \frac{g(\sqrt[3]{17}-1)}{f(\sqrt[3]{17}+1)} = \frac{5}{17} = \boxed{\frac{5}{17}} \checkmark$$

$$f(x)=\sqrt{x-1}\sqrt{x+1} \quad g(x)=\sqrt{x-1}\sqrt{x-1} \quad x \geq 1$$

$$t=\sqrt{x-1} \rightarrow x=t^2+1 \Rightarrow f(x)=\sqrt{t^2+1}\sqrt{t^2+2}=\sqrt{(t^2+1)(t^2+2)}$$

$$g(x)=\sqrt{t^2+1}\sqrt{t^2+1}=\sqrt{(t^2+1)^2}=|t^2+1| \quad f(x)+g(x)=\sqrt{(t^2+1)(t^2+2)}+|t^2+1|$$

$$t \geq 1 \rightarrow t^2+1+t^2+1=2t^2+2=2(t^2+1)=2\sqrt{x-1}\sqrt{x+1} \Rightarrow f(x)+g(x)=2\sqrt{x-1}\sqrt{x+1}$$

$$0 < t < 1 \rightarrow t^2+1-t^2-1=0 \Rightarrow f(x)+g(x)=0$$

$$f(x)=\frac{x+1}{x^2-1}, \quad g(x)=\{(1,1), (1,0), (1,1), (0,1)\}$$

$$\frac{g}{f} \Rightarrow \{(0, \frac{1}{1}), (1, \frac{1}{1})\} \quad D_f \rightarrow f(x)=\frac{x+1}{(x-1)(x-1)} \Rightarrow D_f = \mathbb{R} - \{1\} \Rightarrow f(0)=\frac{1}{1}$$

$$\rightarrow \frac{g}{f} = \{(0, 1), (1, -1)\} \checkmark$$

$$f(x)=\{(1,1), (3,-1), (1,1), (-1,1)\} \quad g(x)=\{(-1,3), (1,-1), (3,1), (-1,0)\}$$

$$الف) f(2x)=\{(\frac{1}{2}, 1), (\frac{3}{2}, -1), (1, 1), (-\frac{1}{2}, 1)\} \checkmark$$

$$ب) f(x^2)=\{(1,1), (-1,1), (\sqrt{3}, -1), (-\sqrt{3}, -1), (1,1), (-1,1)\} \checkmark$$

$$ج) f(g(x)+1)=\{(-1,1), (1,3), (3,1), (-1,1)\} \checkmark$$

$$د) \frac{f}{g}=\{(1,-1), (3,-1)\} \checkmark$$

970 ←