یازدهم ریاضی   بنام خدا   زهرا آصفی

۱)

$f(x) = \left(\frac{1}{2}\right)^{x-2}$, $y = \sqrt{x^3 f(x+1)}$ = ⟶ $D(f)$ ؟ $x^3 f(x+1) \geq 0$

$f(x+1) = 0$

$\to \left(\frac{1}{2}\right)^{x} \times \left(\frac{1}{2}\right)^{-2} - 1 = 4\left(\frac{1}{2}\right)^{x} - 1$

$D(f) = [0,1]$ ⟵ $x = 1$

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۲)

$f(x) = \sqrt{x + |x-2|} \Rightarrow f(-x) = \sqrt{|x-2| - x} \Rightarrow$

$|x-2| - x \geq 0$

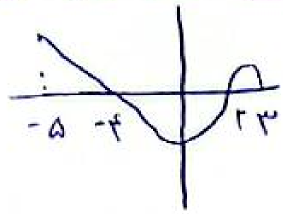
ق ق ع $\leftarrow x-2 \geq x$ $\quad 2x \leq 2$

$x - 2 \leq -x$ $\quad x \leq 1$

$(-\infty, 1]$

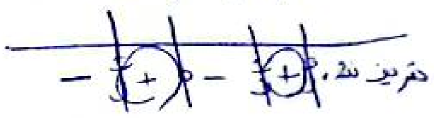
۳-

$y = \sqrt{\frac{x-1}{f(x)}}$



$\to \frac{x-1}{f(x)} \geq 0$

-۴ ۱ ۲ ۳



$D(f) = (-4, 1] \cup (2, 3)$

۴-

$y_1 = \frac{1}{9x^4 - 7x^2 - 6x - 3}$ $\qquad y_2 = \frac{1}{3x^2 + ax + b}$

① $(3x^2 + ax + b)(3x^2 + cx + d)$

$(ac + 3b + 3d)x^2 + (ad + bc)x + bd$

② $\Rightarrow 9x^4 + 3(a+c)x^3 +$

$a + c = 0 \quad a = -c$ $\qquad ad + bc = -6 \xrightarrow[a=-1]{c=1}$ $\qquad 3b + 3d = -6$

$ad + ab = -6$ $\qquad b - d = 4$

$a(d+b) = -6 \to$ $\qquad 2b = -6$

$b = -3$

$\sqrt{-(a+b)} = \sqrt{-(-1-3)} = \sqrt{4} = 2$

⟶ جواب

$f(x) = x^3 + x$ $\quad g = \sqrt{f(x) - f\left(\frac{4}{x}\right)}$ -۵

$$g = \sqrt{x^3 + x - \left(\frac{64}{x^3}\right) - \left(\frac{4}{x}\right)} = \sqrt{\frac{1}{x}(x^2 - 4) + \frac{1}{x^3}(x^2 - 64)} =$$

$$\sqrt{\frac{1}{x}(x^2-4) + \frac{1}{x^3}(x^2-4)(x^4+4x^2+16)} = \sqrt{\frac{1}{x}(x^2-4)\left(1 + \frac{1}{x^2}(x^4+4x^2+16)\right)} =$$

$$\sqrt{\frac{1}{x}(x^2-4)\underbrace{\left(1 + x^2 + \frac{16}{x^2} + 4\right)}_{(+)}} \to \begin{array}{c} - \quad 0 \quad + \\ \hline -4 \quad\quad 4 \end{array} \quad D(f) = [-2, 0) \cup [2, +\infty)$$

۶- $f(x^3 - x) = 2x^2 - 1 \quad f(2) \xrightarrow{-1 = x^3 - x} f(1) = 2(1)^2 - 1 = 1$

$f(2) - f(0) = 1 + 7 = 8$ $\quad f(0) \xrightarrow{x=2} f(8) = 2(2)^2 - 1 = 7$

۷- $f(x) = x^3 - 6x^2 + 12x = (x-2)^3 + 8 \quad g(x) = x^3 + 6x^2 + 12x + 8 = (x+2)^3$

$$\frac{g(\sqrt[3]{7} - 2)}{f(\sqrt[3]{2} + 2)} = \frac{g(\sqrt[3]{7})^3 - 28}{f(\sqrt[3]{16})^3 + 28} = \frac{-20}{10} = -2$$

۸- $f(a) = \sqrt{x + 6\sqrt{x-5} + 6} - 6 = \sqrt{(\sqrt{x-5} + 3)^2}$

$g(x) = \sqrt{x - 6\sqrt{x-5} - 6 + 6} \Rightarrow \sqrt{(\sqrt{x-5} - 3)^2} \to f(x) + g(a) =$

$|\sqrt{x-5} + 3| + |\sqrt{x-5} - 3| = \sqrt{x-5} + 3 + \sqrt{x-5} - 3 = 2\sqrt{x-5}$

$a \quad b \quad c$

$\frac{a+b}{c} = \frac{0+2}{-4} = \frac{-1}{2}$

۹- $f(x) = \frac{x+2}{x^2 - 6x + 5} \to x^2 - 6x + 5 \neq 0 \quad (x-1)(x-5) \neq 0 \quad D(f) = \mathbb{R} - \{1, 5\}$

$g(x) = \{(2,1), (1,0), (3,0), (0,4)\} \quad f(0) \to \frac{2}{3} \quad f(2) = \frac{4}{4 - 8 + 3} = 4$

$$\frac{g}{f} = \left\{\left(2, -\frac{1}{4}\right), \left(0, \frac{1}{\frac{2}{3}}\right)\right\}$$

$f(x) = \{(1,2), (3,-1), (4,2), (-1,4)\}$

$g(x) = \{(-2,3), (1,-1), (3,2), (-1,0)\}$

الف) $f(2x) \Rightarrow \{(\frac{1}{2},2), (\frac{3}{2},-1), (2,2), (-\frac{1}{2},4)\}$

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

ج) $2g^2(x)+1 \Rightarrow \{(-2,19), (1,3), (3,4), (-1,2)\}$

د) $\frac{2f}{g} \Rightarrow \{(1,-4), (3,-1)\}$