دفتر یازدهم ریاضی C

باسمه تعالی

① $f(x) = (\frac{1}{2})^{x-2} - 1 \to y = \sqrt{x^3 \underbrace{f(x+1)}_{(\frac{1}{2})^{x-1}-1}} = ?$

$(\frac{1}{2})^{x-1} - 1 \to x^3 \times \frac{1}{2}^{x-1} - 1 \geq 0$

$0 \leq$

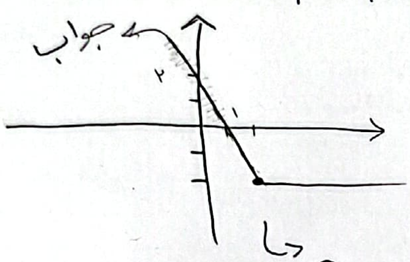
	0		1	
−	0	+	0	−

$(\frac{1}{2})^{x-1} = 1 \to x-1=0 \leftarrow (\frac{1}{2})^{x-1} - 1 = 0$

$\to x = 1$

$\to D = [0,1]$

② $f(-x) = \sqrt{-x+|-x+2|} \to -x + |2-x| \geq 0$



$x<2$	$x \geq 2$
$-x+2-x$	$-x-2+x$
$= -2x+2$	$= -2$

$x=2 \to -2+|0| = -2$

$D_f = (-\infty, 1]$

③ $y = \sqrt{\frac{x-1}{f(x)}}$

	−5		−4		1		2		3
$f(x)$	0	+	0	−		−	0	+	0
$x-1$		−		−	0	+		+	
y	∄	−	∄	+	0	−	∄	+	∄

$\to D_f = (-4, 1] \cup (2, 3)$

④ $y_1 = \frac{1}{9x^4 - 7x^2 - 4x - 3} \neq 0$ $\qquad y_2 = \frac{1}{3x^2+ax+b}$ $\qquad \sqrt{-(a+b)} = ?$

$-7x^2 \to -6x^2 - x^2 \qquad -3 \to -4+1$

$\underbrace{(9x^4 - 6x^2 + 1)}_{(3x^2-1)^2} \underbrace{- x^2 - 4x - 4}_{-(x+2)^2} \to (3x^2-1)^2 - (x+2)^2 \neq 0$

$3x^2 - 1 = x+2$

$3x^2 - x - 3 = 0$

$\sqrt{-(a+b)} = \sqrt{4} = 2$ $\qquad 3x^2 + ax + b \to a = -1$

$b = -3$

(5)

$f(x) = x^3 + x \rightarrow y = \sqrt{f(x) - f(\frac{4}{x})} \quad D_f = ?$

$= \sqrt{x^3 + x - \frac{64}{x^3} - \frac{4}{x}} \geq 0 \rightarrow \frac{x^6 + x^4 - 4x^2 - 64}{x^3} \geq 0 \quad x^2 = t$

$x^3 \rightarrow x \neq 0$ (1)

$t^3 + t^2 + 4t - 64 = (t-4)(t^2 + 5t + 16)$

$(t-4)t^2 \quad (t-4)(t^2+4t+16)$

$t = 4 \quad \Delta = 25 - 64 < 0$

$x^2 = 4 \rightarrow x = \pm 2$ (2)

$-2 \quad 0 \quad 2$

$- \quad + \quad - \quad +$

$D_f = [-2, 0) \cup [2, +\infty)$

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(6)

$f(x^3 + x) = 2x^2 - 1 \qquad f(2) + f(10) = ?$

$x^3 + x - 2 = 0 \rightarrow$

$$\begin{array}{l|l} x^3 + x - 2 & x - 1 \\ -x^3 + x^2 & x^2 + x + 2 \\ \hline x^2 + x - 2 & \\ -x^2 + x & \\ \hline 2x - 2 & \\ -2x + 2 & \\ \hline 0 & \end{array}$$

$\Delta = -7 < 0$

$(x-1)(x^2+x+2) \rightarrow x = 1 \rightarrow f(2) = 2 - 1 = 1$

$x^3 + x - 10 = 0$

$(x-2)(x^2 + 2x + 5)$

$\Delta = -16 <$

$\rightarrow x = 2$

$f(10) = 4 \times 2 - 1 = 7$

$\rightarrow f(2) + f(10) = 1 + 7 = 8$

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(7)

$$\frac{g(\sqrt[3]{7} - 3)}{f(\sqrt[3]{2} + 2)} = \frac{(\sqrt[3]{7} \cancel{-3+3})^3 - 27}{(\sqrt[3]{2} \cancel{+2-2})^3 + 8} = \frac{-20}{10} = -2$$

$f(x) = x^3 - 6x^2 + 12x + 8 - 8$

$= (x-2)^3 + 8$

$g(x) = x^3 + 9x^2 + 27x + 27 - 27$

$(x+3)^3 - 27$

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(8)

$f(x) = \sqrt{x + 4\sqrt{x-4} - 4 + 4} = |\sqrt{x-4} + 2|$

$g(x) = \sqrt{x - 4\sqrt{x-4} - 4 + 4} = |\sqrt{x-4} - 2|$

$x \geq 4$

$f(x) + g(x) = a + b\sqrt{x + c}$

$\xrightarrow{4 \leq x < 8} \sqrt{x-4} + 2 + 2 - \sqrt{x-4} = 4$

$\xrightarrow{x \geq 8} \sqrt{x-4} + 2 + \sqrt{x-4} - 2 = 0 + 2\sqrt{x-4}$

$\frac{a+b}{c} = ?$

$0 + 2\sqrt{x-4} = a + b\sqrt{x+c}$

$a = 0 \quad b = 2 \quad c = -4$

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

[illegible]

(۹)

$$f(x) = \frac{x+2}{x^2-4x+3 \neq 0} \to \underbrace{(x-1)}_{1}\underbrace{(x-3)}_{3} \neq 0$$

$\neq 0 \to x = -2, 1, 3 \to$ ۰ و ۲ از و باقی می‌مانند

$f(2) = -4 \,,\, f(0) = \frac{2}{3} \to \frac{g}{f} = \{(2, \frac{-1}{4}), (0, 6)\}$

(۱۰)

الف) $f(2x) = \{(\frac{1}{2}, 2), (\frac{3}{2}, -1), (2, 2), (-\frac{1}{2}, 6)\}$

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

ج) $2g^2(x)+1 = \{(-2, 19), (1, 3), (3, 9), (-1, 1)\}$

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