زهرا آفخمی — بنام خدا — یازدهم ریاضی — ۲۰

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۱) ۵

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

$f(x+1) = 0$

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

$D(f) = [0, 1] \leftarrow x = 1$

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۲) ۵

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

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

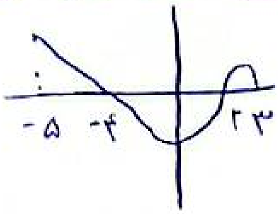
غ ق ق $\leftarrow x - 2 \geq x$ $\quad 2x \leq 2$

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

$\hookrightarrow (-\infty, 1]$

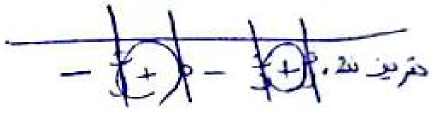
۳- ۵

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



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

-4 1 2 3



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

۴- ۵

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

① $(3x^2 + ax + b)(3x^2 + cx + d)$

② $\Rightarrow 9x^4 + 3(a+c)x^3 + (ac + 3b + 3d)x^2 + (ad + bc)x + bd$

$a + c = 0 \quad a = -c$

$ad + bc = -4 \xrightarrow[a=-1]{c=1}$ $\quad 3b + 3d = -6$

$ad + ab = -4$ $\quad b - d = 4$

$a(d+b) = -4 \rightarrow$ $\quad 2b = -6$

$\hookrightarrow b = -3$

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

۵- (د)

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

$g = \sqrt{x^3 + x - \left(\frac{64}{x^3}\right) - \left(\frac{4}{x}\right)} = \sqrt{\frac{1}{x}(x^2-4) + \frac{1}{x^3}(x^6-64)} =$

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

$\sqrt{\frac{1}{x}(x^2-4)\underbrace{\left(1+x^2+\frac{16}{x^2}+4\right)}_{(+)}} \rightarrow$

-2	0	2

$- \; + \; - \; +$ $\quad D(f) = [-2, 0) \cup [2, +\infty)$

۶- (د)

$f(x^3+x) = 2x^2 - 1 \qquad f(2) \xrightarrow{x=1} f(1+1) = 2(1)^2 - 1 = 1$

$f(2) + f(10) = 1 + 7 = 8 \qquad f(10) \xrightarrow{x=2} f(8+2) = 2(2)^2 - 1 = 7$

۷- (د)

$f(x) = x^3 - 6x^2 + 12x = (x-2)^3 + 8 \qquad g(x) = x^3 + 9x^2 + 27x = (x+3)^3 - 27$

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

۸- (د)

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

$g(x) = \sqrt{x - 4\sqrt{x-4} - 4 + 4} \Rightarrow \sqrt{(\sqrt{x-4} - 2)^2} \rightarrow f(x) + g(x) =$

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

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

۹- (د)

$f(x) = \frac{x+2}{x^2 - 4x + 3} \rightarrow x^2 - 4x + 3 \neq 0 \quad (x-1)(x-3) \neq 0 \quad D(f) = \mathbb{R} - \{1, 3\}$

$g(x) = \{(2,1), (1,0), (3,5), (0,4)\} \qquad f(0) = \frac{2}{3} \qquad f(2) = \frac{4}{4-8+3} = -4$

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

$f(x) = \{(1,2), (3,-1), (4,2), (-1,4)\}$ ۶ ۱۰

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

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) $\frac{2f}{g} \Rightarrow \{(1,-8), (3,-1)\}$