Date :

Subject :

بنام خدا

ستایش خدایاری — یازدهم دختر A — تکلیف : ۵

۱.

$f(x)=\left(\frac{1}{2}\right)^{x-2}-1$

$y=\sqrt{x^2 f(x+1)}$

$D_y=[0,1]$

۲.

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

$2\geq 2x \quad -2x+2\geq 0$

$\boxed{1\geq x} \quad D_{f(x)}=(-\infty,1]$

۳.

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

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

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

۴.

$9x^4-7x^2-4x-3\neq 0 \quad 9x^4-7x^2-4x-3$

$(3x^2-1)^2=(x+2)^2 \Rightarrow |3x^2-1|=|x+2|$

$3x^2-1=x+2 \quad 3x^2-1-x-2=0$

$\Delta=1-4\times 3\times 3=37$

$3x^2-1=-x-2$ ریشه ندارد!

$x_1,x_2=\frac{1\pm\sqrt{37}}{6}\Rightarrow \mathbb{R}-\left\{\frac{1\pm\sqrt{37}}{6}\right\}$

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$\Delta = a^2 - 12b$ $\qquad \dfrac{-a \pm \sqrt{a^2 - 12b}}{6} = \dfrac{1+\sqrt{37}}{6}$ $\qquad \begin{cases} a=-1 \\ b=-3 \end{cases}$

$\sqrt{0-(-1-3)} = \sqrt{4} = 2$ ← دبا شیبار

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۵

$y = \sqrt{f(x) - f(\frac{4}{x})} \geq 0 \qquad f(x) = x^3 + x$

$x^3 + x - \dfrac{4}{x} - \dfrac{64}{x^3} = \dfrac{x^6 + x^4 - 4x^2 - 64}{x^3}$

ریشه تابی $(x^6 - 64) + (x^4 - 4x^2) = (x^3 - 8)(x^3 + 8) + x^2(x^2 - 4)$ ← مزدوج

فنجان درجلسه با مزدوج کردن دوباره کاری کردیم

$(x-2)(x+2)(x^4 + 16 + 8x^2 - 4x^2 + x^2) =$

$(x-2)(x+2)(x^4 + 5x^2 + 16)$

$2 \quad -2 \quad \Delta < 0 \quad$ ۱ همواره

$x^3$

$0$

$-2 \quad 0 \quad 2$

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

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

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۶

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

$x^3 + x - 2 \div (x-1) = x^2 + x + 2$

$-x^3 + x^2$

$x^2 + x - 2$

$-x^2 + x$

$2x - 2$

$-2x + 2$

$0$

$\Delta < 0$

$f(2) \rightarrow x = 1$

$x^3 + x - 10 = 0 \rightarrow x = 2$

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

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**7**

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

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

$$g(\sqrt[3]{7} - 3) = (\sqrt[3]{7})^3 - 27 = -20$$

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

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**8**

$$f(x) = \sqrt{x + 4\sqrt{x-4}} \qquad g(x) = \sqrt{x - 4\sqrt{x-4}}$$

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

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

$$g(x) = \sqrt{x - 4\sqrt{x-4}} = \left|\sqrt{x-4} - 2\right| \qquad (+) = a + b\sqrt{x+c}$$

با توجه به شرط
[illegible] $(+)$ $\longrightarrow$ $2\sqrt{x-4} = a + b\sqrt{x+c}$ $\begin{cases} a = 0 \\ b = 2 \\ c = -4 \end{cases}$ $\frac{a+b}{c} = -\frac{1}{2}$

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**9**

$$x^2 - 4x + 3 \neq 0 \quad (x-3)(x-1) \neq 0 \quad x = 1, 3$$

$$D_f = \mathbb{R} - \{1, 3\}$$

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

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الف $f(2x) = \{(\frac{1}{2}, 12), (\frac{3}{2}, -1), (2, 2), (-\frac{1}{2}, 4)\}$ (15)

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

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

د $\frac{2f}{g}$ $\{(1,-4)(3,-1)\}$

$D_f \cap D_g = \{-1, 3, 1\}$