

نام و نام خانوادگی شماره (۵) کلاس (۱۹۷۵)

$$f(x) = \frac{x}{x+1} \rightarrow f(x+1) = \frac{x+1}{x+2}$$

$$x^2 f(x+1) \geq 0 \rightarrow \frac{x^2}{x+2} \geq 0 \Rightarrow D_f = [0, 1]$$

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$$f(x) = \sqrt{-x+1} \begin{cases} -x+1 & x > 1 \rightarrow -x+1 \geq 0 \rightarrow x \leq 1 \rightarrow x \leq 1 \\ -x-1 & x = 1 \\ -1 & x < 1 \end{cases}$$

$$\Rightarrow f(x) \text{ دایره } = D_f' = (-\infty, 1]$$

$$(D_f : \rightarrow D_f' = (-\infty, 1] \text{ پس } D_f = [-1, +\infty) \text{ (با دایره بزرگی)})$$

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

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$$9x^4 - 4x^2 - 4x - 1 \neq 0 \rightarrow 9x^4 - 4x^2 - 4x - 1 = 9x^4 - 4x^2 + 1 - x^2 - 4x - 1 = (3x^2 - 1)^2 - (x+2)^2 = 0 \Rightarrow (3x^2 - 1)^2 = (x+2)^2 \Rightarrow |3x^2 - 1| = |x+2|$$

$$3x^2 - 1 = -x - 2 \rightarrow 3x^2 + x + 1 = 0 \text{ ریشه ندارد} \quad 3x^2 - 1 = x + 2 \rightarrow 3x^2 - x - 3 = 0 \rightarrow \Delta = 1 - 4(-3)(3) = 1 + 36 = 37$$

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

$$\text{ریشه ها: } \frac{1 \pm \sqrt{37}}{4} \rightarrow D_1 = \mathbb{R} - \left\{ \frac{1 \pm \sqrt{37}}{4} \right\} \Rightarrow D_f = \mathbb{R} - \left\{ \text{ریشه های منجم} \right\}$$

$$\text{برای } y: \Delta = a^2 - 4(b)(c) = a^2 - 12b \rightarrow \frac{-a \pm \sqrt{a^2 - 12b}}{4} = \frac{1 \pm \sqrt{37}}{4} \Rightarrow a = -1, 1 - 12b = 37 \rightarrow b = -3$$

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$$f(x) - f\left(\frac{x}{2}\right) \geq 0 \rightarrow x^2 + x - \frac{x}{2} - \frac{4x}{x^2} = f(x) - f\left(\frac{x}{2}\right) = \frac{x^4 + x^2 - 4x^2 - 4x}{x^2}$$

$$\rightarrow x^4 + x^2 - 4x^2 - 4x = (x^4 - 4x^2) + (x^2 - 4x) = (x^2 - 1)(x^2 + 1) + x^2(x - 4) = (x-1)(x+1)(x^2 + 1) + x^2(x-4) = (x-1)(x+1)(x^2 + 1) + x^2(x-4) = (x-1)(x+1)(x^2 + 1) + x^2(x-4)$$

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

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$$x^4 + x = 10 \rightarrow x^4 + x - 10 = (x^2 - 1) + (x - 2) = (x-2)(x^2 + x + 2) + (x-2)$$

$$= (x-2)(x^2 + x + 2 + 1) = 0 \rightarrow x = 2$$

ریشه ندارد

$$f(10) = r(r)^4 - 1 = 7$$

$$x^4 + x = 2 \rightarrow x^4 + x - 2 = (x^2 - 1) + (x - 1) = (x-1)(x^2 + x + 1) + (x-1)$$

$$= (x-1)(x^2 + x + 2) = 0 \Rightarrow x = 1$$

ریشه ندارد

$$f(r) = r(1)^4 - 1 = 1$$

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

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$$f(x) = x^4 - 4x(x-2) - 1 + 1 = (x-2)^4 + 1$$

$$g(x) = x^4 + 4x(x+2) + 25 - 25 = (x+2)^4 - 25$$

$$g(\sqrt{5} - 2) = (\sqrt{5} - 2 + 2)^4 - 25 = 5 - 25 = -20$$

$$f(\sqrt{5} + 2) = (\sqrt{5} + 2 - 2)^4 + 1 = 1 + 1 = 2$$

$$\rightarrow \frac{-20}{2} = -10$$

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

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

۱) $f \leq x < 1 \rightarrow \sqrt{x-f} + 1 + 1 - \sqrt{x-f} = 2 \rightarrow \frac{f-0}{-f} = -1 = \frac{a+b}{c}$ $a+b\sqrt{x+c}$ فرم استاندارد
 ۲) $x = 1 \rightarrow \sqrt{x-f} + 1 = 1, c = -f, a = 1 \rightarrow \frac{-f}{-f} = 1 = \frac{a+b}{c}$ $a, b, c \neq 0$ و a, b, c صحیح باشند
 ۳) $x > 1 \rightarrow \sqrt{x-f} + 1 + \sqrt{x-f} - 1 = 2\sqrt{x-f} \quad b = 2, c = -f, a = 0 \rightarrow \frac{-f}{-f} = 1 = \frac{a+b}{c}$

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$$x^4 - 4x + 3 \neq 0 \rightarrow (x-2)(x-1) \neq 0 \rightarrow x \neq 1, 2 \Rightarrow D_f = \mathbb{R} - \{1, 2\}$$

$$D_f \cap D_g = \{2, 0\} \rightarrow f(2) = \frac{2}{2-1+2} = \frac{2}{3} = -f$$

$$f(0) = \frac{0}{0-1+2} = 0 = -f$$

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

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

ب) $f(x) = \left\{ (1, 2), (-1, 2), (\sqrt{2}, -1), (-\sqrt{2}, -1), (2, 2), (-2, 2) \right\} \quad (x^2 \neq -1)$

ج) $rg^r(x) + 1 = \left\{ \left(\frac{1}{2}, 4\right), (1, 2), \left(\frac{2}{2}, 4\right), (-1, 2) \right\}$

د) $\frac{rf}{g} \rightarrow D_f \cap D_g = \{1, 2, -1\} \rightarrow \frac{rf}{g} = \left\{ (1, -4), (2, -1) \right\} \quad (-1, \frac{11}{2}) \propto$

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