

$$f(x) = \begin{cases} 2x-1 & x \geq 5 \\ 2x+2 & x < 5 \end{cases} \Rightarrow y = \sqrt{(x)-x+1} \Rightarrow \text{if } x \geq 5 \Rightarrow y = \sqrt{x} \quad \checkmark$$

$$\text{if } x < 5 \Rightarrow y = \sqrt{2x+2} \Rightarrow -\frac{5}{2} \leq x \Rightarrow D_f = [-\frac{5}{2}, +\infty)$$

$$2x+2=0 \Rightarrow x = -1$$

$$y = \frac{3(12x^2 + 12x + 4)}{(2x+1)^2} = \frac{3(2x+1)^2}{(2x+1)^2} = \frac{3}{2x+1} \quad \checkmark$$

$$2x+1=0 \Rightarrow x = -\frac{1}{2} \Rightarrow D_f = \mathbb{R} - \{-\frac{1}{2}\}$$

$$\text{if } x=0 \Rightarrow c = \frac{-2}{-1} \Rightarrow c = 2 \quad \checkmark$$

$$\text{if } x=1 \Rightarrow c = \frac{a+2}{b+1} \Rightarrow b = \frac{c}{c-1} \Rightarrow c + b = \frac{c}{c-1}$$

$$\text{if } x=-1 \Rightarrow c = \frac{1-a}{b-1}$$

بررسی درجۀ هم است ضوابط و مقادیر تابع نیز برابر باشد

$$x^2 + ax + b = 0 \Rightarrow \text{if } x=c \Rightarrow c^2 + ac + b = 0$$

$$\frac{(x-1)(x+1)}{(x-c)^2} = \frac{x+1}{x-c} \Rightarrow c=1 \Rightarrow (x-1)^2 = x^2 + ax + b = x^2 - 2x + 1$$

$$a = -2, b = 1, c = 1 \Rightarrow a+b+c = 0 \quad \checkmark$$

$$g(x) = \underbrace{(x-2)^2(x)}_{f(x+1)} + \underbrace{(-x)^2}_{f(1-x)} = -19x^2$$

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

$$f(1) = f(1-x) \Rightarrow x=0 \Rightarrow \sqrt{x} = 0$$

$$f(-1) + f(1) = 1 + 0 = 1$$

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$$x + \sqrt{x} = 4 \Rightarrow t + t - 4 = 0 \Rightarrow t = 2$$

$$\sqrt{x} = 2 \Rightarrow x = 4 \Rightarrow f(4) = 2 + 1 = 3$$

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

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

$$(1-x)^2 = (x-1)^2$$

$$\Rightarrow f(x-1) + f(1-x) = 0$$

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$$D_g = \left[\frac{b}{a}, \frac{c}{a} \right] \text{ و } D_f = \left[\frac{a}{c}, \frac{b}{c} \right] \Rightarrow \frac{a}{c} = \frac{b}{c} \Rightarrow a = b$$

$$f(1) = g(1) = 1$$

$$f(x) = g(x) = 1 \Rightarrow x = 1$$

$$4a - \frac{b}{c} = \frac{c}{a} - \frac{a}{c} = (-1) = -1$$

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$$D_g = [-1, +\infty) \text{ و } D_f = (-\infty, m] \Rightarrow D_g \cap D_f = [-1, m] \Rightarrow m \geq -1$$

$$f(x) = g(x) = \sqrt{x} + n = \sqrt{1} = 1 \Rightarrow \sqrt{x} = 1 - n$$

$$n = \sqrt{x} - 1$$

$$m + n = \sqrt{x} + 1$$

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