

$$f(x) = \begin{cases} 2x-1 & x \geq 0 \\ 2x+2 & x < 0 \end{cases} \Rightarrow y = \sqrt{(x)-2x+1} \Rightarrow \text{if } x \geq 0 \Rightarrow y = \sqrt{x} \quad \checkmark$$

$$\text{if } x < 0 \Rightarrow y = \sqrt{2x+2} \Rightarrow -\frac{1}{2} \leq x \Rightarrow D_f = [-\frac{1}{2}, +\infty)$$

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

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

$$2x+1 \neq 0 \Rightarrow x \neq -\frac{1}{2} \Rightarrow D_f = \mathbb{R} - \left[-\frac{1}{2}\right]$$

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

$$\begin{aligned} \text{if } x=1 &\Rightarrow 3 = \frac{a+2}{b+1} \\ \text{if } x=-1 &\Rightarrow 1 = \frac{2-a}{b-1} \end{aligned} \Rightarrow b = \frac{1}{2} \Rightarrow c + b = \frac{5}{2}$$

بررسی درجۀ هم است ضوابط و مقادیر باید نیز برابر باشند $\Rightarrow$

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

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

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

$$g(x) = \underbrace{(x-2)^2(x)}_{f(x+1)} + \underbrace{6(x+2)^2(-x)}_{f(1-x)} = -18x^2$$

$$\left. \begin{aligned} f(-1) &= f(1-x) \Rightarrow x=1 \Rightarrow \sqrt{x} = \sqrt{1} \\ f(1) &= f(1-x) \Rightarrow x=-1 \Rightarrow \sqrt{1} + \sqrt{1} = 2 \end{aligned} \right\} \xrightarrow{+} f(-1) + f(1) = 2$$

$$\begin{aligned} x + \sqrt{x} &= 4 \Rightarrow t + t - 4 = 0 \Rightarrow t = 2 \quad \therefore t = 2 \Rightarrow x = 4 \\ \sqrt{x} &= 2 \Rightarrow x = 4 \Rightarrow f(4) = 2 + 1 = 3 \end{aligned}$$

$$\begin{aligned} f(x-1) &= (x-1)^2 + x-1 \\ f(1-x) &= (1-x)^2 + 1-x \\ \Rightarrow f(x-1) + f(1-x) &= 0 \end{aligned}$$

$$\begin{aligned} D_g &= x \in \left[\frac{b}{r}, \frac{a}{r} \right] \text{ و } D_f = x \in \left[\frac{c}{r}, \frac{d}{r} \right] \Rightarrow \frac{c}{r} \leq \frac{b}{r} < \frac{a}{r} \leq \frac{d}{r} \\ \text{فإن } D_f \cap D_g &= \left[\frac{c}{r}, \frac{b}{r} \right] \\ \text{و } D_g \cap D_f &= \left[\frac{c}{r}, \frac{b}{r} \right] \\ \text{فإن } D_f \cap D_g &= D_g \cap D_f \\ \text{فإن } D_f \cap D_g &= D_g \cap D_f \end{aligned}$$

$$\begin{aligned} D_g &= [-1, +\infty) \text{ و } D_f = (-\infty, m] \Rightarrow D_g \cap D_f = [-1, m] \Rightarrow m \geq -1 \\ f(x) - g(x) &= \sqrt{x-1} + n - \sqrt{x} = 0 \Rightarrow \sqrt{x-1} = \sqrt{x} - n \\ \text{فإن } \sqrt{x-1} &= \sqrt{x} - n \Rightarrow \sqrt{x-1} + n = \sqrt{x} \end{aligned}$$