

$$f(x) = \begin{cases} x_{n-1} & ; [x] > f \\ f_{n+1} & ; [x] \leq f \end{cases} \Rightarrow f(x) = \begin{cases} x_{n-1} & ; x \geq \Delta \\ f_{n+1} & ; x < \Delta \end{cases}$$

$$f(x) - x + 1 \geq 0 \begin{cases} \text{if } x \geq \Delta \Rightarrow x \geq 0 \Rightarrow [\Delta, +\infty) \\ \text{if } x < \Delta \Rightarrow x_{n+1} \geq 0 \Rightarrow x \geq -\frac{f}{p} \Rightarrow [-\frac{f}{p}, \Delta) \end{cases} \Rightarrow D = [-\frac{f}{p}, +\infty)$$

$$y = \frac{px^p + qx^q + rx + s}{(fx^f + gx + h)^g} = \frac{p(1x^p + 1qx + 4x + 1)}{(1x + 1)^g} = \frac{p(1x + 1)^p}{(1x + 1)^f}$$

$$= \frac{p}{1x + 1} \Rightarrow D = \mathbb{R} - \left\{ -\frac{1}{p} \right\}$$

$$f(x) = \begin{cases} \frac{x^p + 2x^q - x - y}{x^r - 1} & ; x \neq \pm 1 \\ \frac{ax + y}{x + b} & ; x = \pm 1 \end{cases} \Rightarrow \frac{x^p(x + y) - (x + y)}{x^r - 1} = \frac{(x + y)(x^p - 1)}{x^r - 1} = x + y$$

$$\text{if } x \neq \pm 1 \Rightarrow g(x) = f(x) \Rightarrow x + c = x + y \Rightarrow c = y \quad (1) \Rightarrow g(x) = x + y$$

$$\text{if } x = 1 \Rightarrow f(x) = g(x) \Rightarrow \frac{a + y}{1 + b} = y \Rightarrow a + y = y + yb \Rightarrow a = yb + 1$$

$$\text{if } x = -1 \Rightarrow f(x) = g(x) \Rightarrow \frac{-a + y}{-1 + b} = 1 \Rightarrow y - a = b - 1 \Rightarrow a = y - b$$

$$\Rightarrow yb + 1 = y - b \Rightarrow b = \frac{1}{y} \quad (2) \quad \Rightarrow b + c = y + \frac{1}{y} = \frac{y^2 + 1}{y}$$

$$f(x) = g(x) \Rightarrow \frac{(x-1)(x+1)}{x^r + ax + b} = \frac{x + y}{x - c} \quad \text{بجای } x=1 \text{ در } f(x) \text{ و } g(x) \text{ قرار دهیم}$$

$$1 - c = 0 \Rightarrow c = 1$$

$$x^r + ax + b = (x-1)(x-c) = (x-1)^2 = x^2 - 2x + 1 \Rightarrow a = -2, b = 1$$

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



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

$$f(1-2x) = \begin{cases} \sqrt{x} + 1 & ; x \leq 0 \\ \sqrt{x} & ; x > 0 \end{cases} \quad \textcircled{1} 1-2x = -1 \Rightarrow x = 1 \Rightarrow f(-1) = 1 \\ \textcircled{2} 1-2x = 1 \Rightarrow x = 0 \Rightarrow f(1) = 1 \\ \Rightarrow f(-1) + f(1) = 1 + 1 = 2$$

$$x + \sqrt{x} = 4 \xrightarrow{\sqrt{x}=t} t^2 + t - 4 = 0 \Rightarrow \underbrace{(t-2)}_{\sqrt{x}} \underbrace{(t+2)}_{-\sqrt{x}} = 0 \Rightarrow \sqrt{x} = 2 \Rightarrow x = 4 \\ \Rightarrow f(4) = (f)^4 + 1(f) = 16 + 1 = 17$$

$$f(x-1) + f(1-x) = (x-1)^2 + (x-1) + (1-x)^2 + (1-x) = (x-1)^2 + (x-1) - (x-1)^2 - (x-1) = 0$$

$$D_f \Rightarrow f(x) - 3a \geq 0 \Rightarrow x \geq \frac{3a}{f} \quad \text{بما ان } f \neq 0 \text{ و } x = 1 \text{ هو الحل} \\ D_g \Rightarrow b - fx \geq 0 \Rightarrow x \leq \frac{b}{f} \Rightarrow D_{f \cap g} = \left[\frac{3a}{f}, \frac{b}{f} \right] \rightarrow \frac{3a}{f} = 1 = \frac{b}{f} \Rightarrow a = \frac{f}{3}, b = f \\ (xf - g)(1) = xf(1) - g(1) = x\sqrt{f-f} + xk - 1 = \sqrt{f-f} + xk = k \\ \Rightarrow -2k = 1 \Rightarrow k = -1 \\ \Rightarrow 3a - \frac{b}{f} - k = f - 1 + 1 = 1$$

$$D_f \Rightarrow m - x \geq 0 \Rightarrow m \geq x \Rightarrow D_f = (-\infty, m] \\ D_g \Rightarrow x + 1 \geq 0 \Rightarrow x \geq -1 \Rightarrow D_g = [-1, \infty) \\ \Rightarrow m = 1 \\ D_f \cap D_g = [-1, m] = [-1, 1]$$

$$f(x) - g(x) = 4\sqrt{x} \Rightarrow x + 1 - 2\sqrt{x} = 4\sqrt{x} \Rightarrow x = 8\sqrt{x} - 1 \\ \Rightarrow m + n = 1 + 8\sqrt{x} - 1 = 8\sqrt{x}$$