

سوال ۱: $y = \sqrt{f(x) - x + 1}$ $f(x) = \begin{cases} 2x-1 & [x] \geq 2 \rightarrow x \geq 2 \\ 2x+3 & [x] \leq 2 \quad x < 2 \end{cases}$

$x \geq 2 \rightarrow y = \sqrt{2x-1-x+1} = \sqrt{x} \rightarrow x \geq 0$

$x < 2 \rightarrow y = \sqrt{2x+3-x+1} = \sqrt{x+2} \quad 3x+2 \geq 0 \rightarrow x \geq -\frac{2}{3}$

$\rightarrow D = [-\frac{2}{3}, +\infty)$

سوال ۲: $y = \frac{2^x x^3 + 3^x x^2 + 1 \wedge x + 3}{(2^x x^2 + 3^x x + 1)^2} = \frac{3(1 \wedge x^2 + 12x^2 + 4x + 1)}{(2x+1)^2} = \frac{3(2n+1)^3}{(2n+1)^2} \quad n \neq -\frac{1}{2}$

$f(x) = \begin{cases} \frac{x^3 + 2x^2 - x - 2}{x^2 - 1} & ; x \neq \pm 1 \\ \frac{ax+b}{x+2} & ; x = \pm 1 \end{cases}$

$D = \mathbb{R} - \{-\frac{1}{2}\} \quad \leftarrow \frac{3}{2n+1}$

$g(x) = x + c$
 $b + c = ?$

سوال ۳:

$\frac{x^3 + 2x^2 - x - 2}{x^2 - 1} \Big| \frac{x^2 - 1}{x+2} \Rightarrow g(x) = f(x) \rightarrow x+2 = x+c$
 $c = 2$

$g(1) = 1+c = 1+2=3 \rightarrow f(1) = \frac{a+2}{1+b} = 3 \rightarrow a+2 = 3+b$
 $a-b = 1$
 $g(-1) = -1+2=1 \rightarrow f(-1) = \frac{-a+2}{-1+b} = 1 \rightarrow -1+b = -a+2$
 $b+a = 3$

$\begin{cases} a-b = 1 \\ -b+a = -2 \end{cases} \rightarrow \begin{cases} -2b = -1 \\ b = \frac{1}{2} \end{cases}$
 $c+b = 2 + \frac{1}{2} = \frac{5}{2}$

سوال ۴: $f(x) = \frac{x+1}{x-c} \quad g(x) = \frac{x^2-1}{x^2+ax+b} \rightarrow a+b+c = ?$
 $\hookrightarrow \frac{(x-1)(x+1)}{x^2+ax+b} = \frac{x+1}{x-c} \quad \frac{-1}{x^2+ax+b} = 0$
 $\checkmark (x-1)^2 \rightarrow x^2+1-2x \rightarrow b=1 \quad a=-2$

سوال ۵: $f(x) = (x-2)^2(x-1) \quad g(x) = f(x+1) + f(1-x) = ?$
 $\begin{cases} f(x+1) = (x-2)^2(x) \\ f(1-x) = (-x-2)^2(-x) \end{cases} \quad g(x) = (x-2)^2(x) + (-x-2)^2(-x)$
 $\checkmark x((x-2)^2 - (x+2)^2) = -12x^2$
 $x^2+4x-4 - (x^2+4x+4)$

$$f(1-2x) = \begin{cases} \sqrt[3]{x} + 2 & x \leq 0 \\ \sqrt{x} & x > 0 \end{cases}$$

$$f(-1) + f(3) = ? \quad 1 + 2 = \boxed{3}$$

سوال ٦:

$$1-2x = -1 \rightarrow x = 1 \rightarrow f(-1) = \sqrt{1} = 1 \quad \begin{matrix} \nearrow 1-2x = 3 \rightarrow x = -1 \\ f(3) = \sqrt[3]{-1} + 2 = 1 \end{matrix}$$

$$f(x+\sqrt{x}) = x^2 + 3x \rightarrow f(4) = ?$$

سوال ٧:

$$x + \sqrt{x} = 4$$

$$\sqrt{x} = 4 - x \xrightarrow{\text{مربع}} x = 16 + x^2 - 8x \rightarrow x^2 - 12x + 16 = 0 \rightarrow (x-4)(x-4) = 0$$

$$x = 4 \quad x = 4 \quad \checkmark$$

$$f(4) = 4^2 + 3 \cdot 4 = 16 + 12 = 28$$

$$f(x) = x^3 + x \rightarrow f(x-1) + f(1-x) = ?$$

سوال ٨:

$$\left. \begin{aligned} f(x-1) &= (x-1)^3 + x-1 \\ f(1-x) &= (1-x)^3 - x+1 \end{aligned} \right\} (x-1)^3 + x-1 + (1-x)^3 - x+1 = 0$$

$$f(x) = \sqrt{fx - 3a} + k - 1 \quad g(x) = \sqrt{b - fx} + 3k$$

سوال ٩:

$$2f - g = \{0, k\} \quad 3a - \frac{b}{2} - k = ? \quad b - fx \geq 0 \rightarrow b \geq fx \rightarrow x \leq \frac{b}{f}$$

$$D: fx - 3a \geq 0 \rightarrow x \geq \frac{3a}{f} \quad x = 1 \rightarrow \frac{3a}{f} = 1 \rightarrow a = \frac{f}{3} \quad b = f$$

$$2f(1) - g(1) = k \rightarrow 2(\sqrt{f \cdot 1 - 3 \cdot \frac{f}{3}} + k - 1) - (\sqrt{b - f \cdot 1} + 3k) = k$$

$$\frac{2f}{3} - \frac{f}{3} - (-1) = 3$$

$$f(x) = \sqrt{m-x} + n \quad g(x) = \sqrt{2x+2} \rightarrow D_{f \times g} = [-1, 5]$$

سوال ١٥:

$$f - g(3) = 4\sqrt{2} \quad m+n = ? \quad 2x+2 \geq 0$$

$$m-x \geq 0$$

$$m \geq x$$

$$x \geq -1$$

$$m = 5$$

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

$$\sqrt{m-3} + n - \sqrt{2 \cdot 3 + 2} = 4\sqrt{2}$$

$$\sqrt{m-3} + n - 2 = 4\sqrt{2}$$

$$n = 4\sqrt{2} + 2 - \sqrt{m-3}$$

$$m+n = 5 + 4\sqrt{2} + 2 - \sqrt{m-3}$$