

۱۷,۵

$$f(x) = \sqrt{x+t\sqrt{x-t}} \quad , \quad g(x) = \sqrt{x-t\sqrt{x-t}} \Rightarrow t = \sqrt{x-t} \Rightarrow x \geq 4 \Rightarrow t \geq 2$$

$$f = t+2, \quad g = t-2$$

$$f+g=2t=2\sqrt{x-t} \Rightarrow a=0 \quad b=2 \quad c=-t$$

$$\frac{a+b}{c} = -\frac{1}{2} \quad \checkmark \quad \text{پ}$$

$$f(x) = \frac{x+2}{x^2-tx+2} \quad \left. \begin{array}{l} \Rightarrow x=0 = \frac{2}{2} = 1 \\ x=2 = \frac{1}{1} = 1 \end{array} \right\}$$

$$g(x) = \left\{ (1,1), (1,0), (2,2), (0,2) \right\}$$

$$\frac{g}{f} = \left\{ (0,2), (2,-1) \right\} \quad \text{پ}$$

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

$$g(x) = \left\{ (-2,2), (1,-1), (2,2), (-1,0) \right\}$$

$$f(2x) = \left\{ \left(-\frac{1}{2}, 4\right), \left(\frac{1}{2}, 2\right), \left(\frac{2}{2}, -1\right), (2, 2) \right\}$$

$$u^2 = 3 \rightarrow u = \pm\sqrt{3}$$

$$f(u^2) = \left\{ (-2, 2), (1, 2), (2, 2), (2, 2) \right\} \text{ و } (\pm\sqrt{3}, -1) \quad \text{پ}$$

$$g: \left\{ (2, 2), (1, -1), (2, 2), (-1, 0) \right\} \quad \text{پ}$$

$$d: \left\{ (1, -1), (2, -2) \right\}$$

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

$$g(x) = \left\{ (-2,2), (1,-1), (2,2), (-1,0) \right\}$$

$$\Rightarrow \begin{cases} x=2 \Rightarrow h(2) = 2(1) + 2 = 4 \\ x=3 \Rightarrow h(3) = 2(2) + 2 = 6 \\ x=-2 \Rightarrow h(-2) = 2(0) + 4 = 4 \end{cases}$$

$$h = 2f + g \Rightarrow h = \left\{ (2,4), (3,6), (-2,4) \right\} \quad \text{پ}$$

$$g(x) = [x] + [-x] \rightarrow \begin{cases} x = \text{صحیح} \Rightarrow g(x) = 0 \\ x = \text{صفر نباشد} \Rightarrow g(x) = -1 \end{cases}$$

$$f(x) = \frac{\sqrt{3x-x}}{x-2} \rightarrow \sqrt{3x-x} \geq 0 \rightarrow 0 \leq x \leq 3 \rightarrow 0, 1, 2, 3$$

خ → صفر نیست
است!

$$D = \{0, 1, 2, 3\} \quad \text{پ}$$

$$f(x) = \sqrt{ax - x^2 - 4}$$

$$\Rightarrow ax - x^2 - 4 \geq 0 \Rightarrow x^2 + 4 \leq ax \Rightarrow \frac{x^2}{x} + \frac{4}{x} \leq a \Rightarrow (x-1)(x-4) \leq 0$$

$$1 \leq x \leq 4$$

$$g(x) = [(1,0), (2, \sqrt{3}), (4,0), (a,b)]$$

$$x = 1, 2, 4$$

$$h(x) = \frac{f(x)}{g(x)} = [(1,0), (2, \frac{\sqrt{3}}{2}), (4,0)]$$

انی:

$$y = x^3 - 3x^2 + 3x \rightarrow \text{بررسی تابع چند جمله‌ای از مرتبه 3 فرد برابر R است}$$

$$R_y = \mathbb{R} \text{ باید!}$$

ب:

$$y = \frac{1}{x^2 - 2x} \rightarrow (x-1)^2 - 1 \text{ مخرج به 0 نمی‌رسد}$$

$$R_y = (-\infty, -1] \cup (0, +\infty)$$

$$1, 2, 5$$

۱۵:

$$y = x^2 - 4x + 10$$

$$x_s = \frac{-b}{2a} = \frac{4}{2} = 2$$

$$y_s = 2 \rightarrow$$

$$R_y = [2, +\infty)$$

۱۵:

$$y = -x^2 + 4x + 3$$

$$x_s = \frac{-b}{2a} = \frac{-4}{-2} = 2$$

$$y_s = 7 \rightarrow$$

$$R_y = (-\infty, 7]$$

$$R_y = (-\infty, 7]$$

۵:

$$y = \sqrt{x^2 - 4x + 3}$$

$$x_s = \frac{-b}{2a} = \frac{4}{2} = 2$$

$$y_s = 1 \rightarrow$$

$$R_y = [1, +\infty)$$

$$R_y = [1, +\infty)$$

۲۵:

$$y = \sqrt{4x - x^2}$$

$$x_s = \frac{-b}{2a} = \frac{4}{-2} = -2$$

$$y_s = 2 \rightarrow$$

$$R_y = [0, 2]$$

$$R_y = [0, 2]$$

انی:

$$y = x^3 - 3x^2 + 3x + 1$$

تابعی از مرتبه 3 فرد

$$R_y = \mathbb{R}$$

$$y = x^3 - 4x^2 + 3x + 2$$

تابعی از مرتبه 3 فرد

$$R_y = \mathbb{R}$$

$$y = \sqrt{x^3 - 4x^2 + 6x + 1}$$

عبارت زیر رادیکال مرتبه فرد دارد و همیشه مثبت و متناهی است، پس R است.

$$R_y = [0, +\infty)$$

$$y = (x^3 - 4x^2 + 3x + 1)^2$$

مربع هر عددی، نامتناهی است.

$$R_y = [0, +\infty)$$

انی:

$$y = \frac{3x+1}{x-2}$$

$$\rightarrow y = \frac{ax+b}{cx+d}$$

$$\rightarrow \mathbb{R} = \mathbb{R} - \left\{ \frac{a}{c} \right\}$$

$$R_f = \mathbb{R} - \left\{ \frac{3}{-2} \right\}$$

ب:

$$y = \frac{2x+1}{x+1}$$

$$\rightarrow y = \frac{ax+b}{cx+d}$$

$$\rightarrow \mathbb{R} = \mathbb{R} - \frac{a}{c}$$

$$R_f = \mathbb{R} - \left\{ \frac{2}{1} \right\}$$

$$f(x_n) = \left\{ \left(\frac{1}{x}, 2\right) \left(\frac{x}{2}, -1\right) (2, 2) \left(-\frac{1}{x}, 4\right) \right\} \quad x \text{ های } f \text{ باید مقیم بر ۲ باشند!} \quad (۳)$$

$$f(x_n) = \left\{ (1, 2) (-1, 2) (\sqrt{3}, -1) (-\sqrt{3}, -1) (2, 2) (-2, 2) \right\} \quad \text{هرکدام از } x \text{ های } f \text{ را برابر } x^2 \text{ قرار دهیم!}$$

$$f(g(n)+1) = \left\{ (-2, 19) (1, 3) (3, 9) (-1, 1) \right\} \quad \text{این عمل روی } y \text{ های و اعمال می‌شود:}$$

$$\frac{f}{g} = \left\{ \left(1, \frac{2 \times 2}{-1}\right) \left(3, \frac{2 \times -1}{2}\right) \text{ و } \left(-1, \frac{2 \times 4}{-2}\right) \right\} = \left\{ (1, -4) (3, -1) \right\}$$

$$(الف) \quad y = n^3 - 2n^2 + 2n - 1 + 1 = y = (n-1)^3 + 1 \quad (۷)$$

$$y-1 = (n-1)^3 \rightarrow \sqrt[3]{y-1} = n-1 \rightarrow n = \sqrt[3]{y-1} + 1$$

$$R_f = \mathbb{R}$$

$$(ب) \quad y = \frac{1}{n^2 - 2n} \rightarrow n^2 y - 2n y = 1 \rightarrow n^2 y - 2n y - 1 = 0$$

$$\xrightarrow{y \neq 0} \quad n = \frac{2y \pm \sqrt{4y^2 + 4y}}{2y} \rightarrow 4y(y+1) \geq 0 \rightarrow \frac{-1}{+} \frac{0}{+}$$

$$\xrightarrow{y=0} \quad 0 = 1 \quad x \text{ حقیقی وجود ندارد!} \rightarrow R_f = (-\infty, -1] \cup (0, +\infty)$$

$$\text{الف - ١)} \quad y = x^2 - 2x + 1 \rightarrow \min \left\{ \begin{array}{l} x = \frac{2}{2} = 1 \\ y = 1 - 2 + 1 = 0 \end{array} \right. \rightarrow \text{Rf} = [0, +\infty)$$

$$\text{ب - ١)} \quad y = -x^2 + 4x + 3 \rightarrow \max \left\{ \begin{array}{l} x = \frac{-4}{-2} = 2 \\ y = -9 + 18 + 3 = 12 \end{array} \right. \rightarrow \text{Rf} = (-\infty, 12]$$

$$\text{ج - ١)} \quad y = x^2 - 2x - 3 \rightarrow \min \left\{ \begin{array}{l} x = \frac{2}{2} = 1 \\ y = 1 - 2 - 3 = -4 \end{array} \right. \rightarrow \text{Rf} = \sqrt{[-4, +\infty)} = [0, +\infty)$$

$$\text{د - ١)} \quad y = 4x - x^2 \rightarrow \max \left\{ \begin{array}{l} x = \frac{-4}{-2} = 2 \\ y = 18 - 9 = 9 \end{array} \right. \rightarrow \text{Rf} = \sqrt{(-\infty, 9]} = [0, 9]$$