

$$f(x) = \sqrt{(x-2)+2}^2 = |\sqrt{x-2}+2| \xrightarrow{x \geq 1} \sqrt{x-2}+2 \geq 0 \quad (1)$$

شماره کسری باید نوشته شود؟

$$c = -2 \quad b = 1 \quad a = 2$$

$$\frac{a+b}{c} = \frac{2+1}{-2} = -\frac{3}{2}$$

$$\frac{a+b}{c} = -\frac{1}{2}$$

(۱۵)

$$\frac{x+2}{(x-1)(x-3)} \rightarrow x \neq 1, 3$$

$$f(x) = \frac{2+2}{2-1+3} = \frac{4}{-1} = -4 \quad (2)$$

$$\frac{g(x)}{f(x)} = \frac{1}{-4} = -\frac{1}{4}$$

$$f(0) = \frac{0+2}{0-0+3} = \frac{2}{3}$$

$$\frac{g(x)}{f(x)} = \frac{4}{\frac{2}{3}} = 4 \times \frac{3}{2} = 6$$

$$(1) \left\{ \left(\frac{1}{2}, 2 \right), \left(\frac{3}{2}, -1 \right), (2, 2), \left(-\frac{1}{2}, 4 \right) \right\}$$

$$2x = 1, 3, 4, -1$$

(۳)

$$(2) \left\{ (1, 2), (-1, 2), (\sqrt{3}, -1), (-\sqrt{3}, -1), (2, 2), (-2, 2) \right\}$$

$$x^2 = 1, 3, 4$$

$$ج) \quad g(-2) = 3 \rightarrow 2(x^2) + 1 = 19$$

$$g(1) = -1 \rightarrow 2(-1)^2 + 1 = 3$$

$$g(3) = 2 \rightarrow 2(3^2) + 1 = 19$$

$$g(-1) = 0 \rightarrow 2(0^2) + 1 = 1$$

$$\left\{ (-2, 19), (1, 3), (3, 19), (-1, 1) \right\}$$

$$د) \quad \frac{2f(1)}{g(1)} = \frac{2}{-1} = -2$$

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

$$\frac{2f(-1)}{g(-1)} = \frac{12}{0} \times$$

$$\left\{ (1, -2), (3, -1) \right\}$$

$$h = 2f + g \quad 2f(x) + g(x) = 5$$

$$2f(x) + g(x) = 5$$

(۴)

$$f: 2 \rightarrow 1 \quad 3 \rightarrow 1 \quad -2 \rightarrow 0$$

$$2f(x) + g(x) = 4$$

$$g: 2 \rightarrow 3 \quad 3 \rightarrow 3 \quad -2 \rightarrow 4$$

$$\left\{ (2, 5), (3, 5), (-2, 4) \right\}$$

(۵)

$$g(x) + 1 \neq 0$$

$$[x] + [-x] = 0 \quad x \in \mathbb{Z} \quad \checkmark$$

(۵)

$$x \notin \mathbb{Z}$$

$$[x] + [-x] = -1 \quad x \notin \mathbb{Z}$$

$$\sqrt{3}x - x \notin \mathbb{Z}$$

$$[0, 3] \rightarrow \text{اعداد صحیح}$$

$$\sqrt{3}x \notin \mathbb{Z}$$

$$\rightarrow 0, 1, 2, 3 \rightarrow \text{اعداد صحیح}$$

$$3x \notin \mathbb{Z}$$

$$D_{\frac{1}{g+1}} = \{ \dots, 1, 3 \}$$

(۶)

$$x(3-x) \notin \mathbb{Z} \rightarrow 0 \leq x \leq 3, x \neq 2$$

$$f(1) = \sqrt{10-1-9} = 0$$

$$h(1) = 0$$

$$f(2) = \sqrt{10-4-6} = \sqrt{0} = 0$$

$$h(2) = \frac{\sqrt{2}}{2}$$

د

$$f(5) = \sqrt{10-14-9} = 0$$

$$h(5) = 0$$

$$f(5) = \sqrt{10-25-9} = \sqrt{-24} \times$$

$$\{(1,0), (2, \frac{\sqrt{2}}{2}), (5,0)\}$$

$$a) x^3 - 3x^2 + 3x$$

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

$$y-1 = (x-1)^3$$

$$\sqrt[3]{y-1} = x-1$$

$$x = \sqrt[3]{y-1} + 1$$

$$R_y = \mathbb{R}$$

$$b) yx^2 - 2xy = 1$$

$$0-0=1x$$

$$yx^2 - 2xy - 1 = 0$$

1,5

$$\Delta = (-2y)^2 - 4(-1)(y) \geq 0$$

$$4y^2 + 4y \geq 0$$

$$y^2 + y \geq 0$$

$$y(y+1) \geq 0$$

$$y(y+1) \geq 0$$

$$\frac{-1 \pm \sqrt{1+4}}{2} = \frac{-1 \pm \sqrt{5}}{2}$$

$$R_y = (-\infty, \frac{-1-\sqrt{5}}{2}] \cup [\frac{-1+\sqrt{5}}{2}, +\infty)$$

بافرض $y \neq 0$ عبارت را در y^2 فرض کردیم!

الف)

$$x = \frac{9}{2} = 4.5$$

$$y(4.5) = 9 - 18 + 10 = 1$$

$$\oplus x^2 \rightarrow R_y = [1, +\infty)$$

1A

15

ب)

$$x = \frac{-4}{-2} = 2$$

$$y(2) = -4 + 18 + 3 = 17$$

$$\ominus x^2 \rightarrow (-\infty, 17]$$

5A

15

ج)

$$x = \frac{9}{2} = 4.5$$

$$y(4.5) = \sqrt{4.5^2 - 18 - 3} = \sqrt{-1.25}$$

$$\sqrt{[-1.25, +\infty)} = [-1.25, +\infty)$$

باید همیشه عبارت را مثبت آوردی و سپس از زیر دسری
مادریال گیری!

$$15) x = \frac{-4}{-2} = 2$$

$$y(2) = \sqrt{18 - 9} = \sqrt{9} = 3$$

باید آخر کار از کف برد مادریال گیری!

$$\ominus x^2 \rightarrow (-\infty, 4] \rightarrow \sqrt{(-\infty, 4]} = [-2, 2]$$

یا فقط یک بار از کف مادریال گیری!

الف) $\mathbb{R}$

ب) $\mathbb{R}$

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ج) $[2, +\infty)$

د) $y \geq 0$ پس $y \geq 0$ و $y \geq 2$ پس $y \geq 2$

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

$$الف) \left(\frac{2x+1}{1-x-2} \right)$$

$$R_y = \mathbb{R} - \{3\}$$

د

$$ب) \left(\frac{2x+1}{1-x+1} \right)$$

$$R_y = \mathbb{R} - \{2\}$$

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$$f(n) = \sqrt{x-r+r\sqrt{n-r}+r} = \sqrt{(\sqrt{n-r}+r)^2} = |\sqrt{n-r}+r| = \sqrt{n-r}+r \quad (1)$$

$$g(n) = \sqrt{x-r-r\sqrt{n-r}+r} = \sqrt{(\sqrt{n-r}-r)^2} = |\sqrt{n-r}-r| \xrightarrow{n \geq 1} \sqrt{n-r}-r$$

$$f(n)+g(n) = \sqrt{n-r}+r+\sqrt{n-r}-r = 2\sqrt{n-r} \begin{matrix} \rightarrow a=0 \\ \rightarrow b=r \\ \rightarrow c=-r \end{matrix} \rightarrow \frac{a+b}{c} = \frac{r}{-r} = -\frac{1}{r}$$

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

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

$$R_f = \mathbb{R}$$

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

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

$$y = 0 \rightarrow 0 = 1 \times \text{صحيح وجب ان يدار!} \rightarrow R_f = (-\infty, -1] \cup (0, +\infty)$$

$$1- (الف) \quad y = n^2 - 2n + 1 \rightarrow \min \begin{cases} n = \frac{2}{1} = 2 \\ y = 4 - 2 + 1 = 4 \end{cases} \rightarrow R_f = [4, +\infty)$$

$$1- (ب) \quad y = -n^2 + 4n + 3 \rightarrow \max \begin{cases} n = \frac{-4}{-2} = 2 \\ y = -9 + 16 + 3 = 10 \end{cases} \rightarrow R_f = (-\infty, 10]$$

$$1- (ج) \quad y = n^2 - 2n - 3 \rightarrow \min \begin{cases} n = \frac{2}{1} = 2 \\ y = 4 - 4 - 3 = -3 \end{cases} \rightarrow R_f = \sqrt{[-3, +\infty)} = [0, +\infty)$$

$$1- (د) \quad y = 4n - n^2 \rightarrow \max \begin{cases} n = \frac{-4}{-2} = 2 \\ y = 16 - 4 = 12 \end{cases} \rightarrow R_f = \sqrt{(-\infty, 12]} = [0, 12]$$