

۱۹ آزمون

$$f(x) = \sqrt{x+4}\sqrt{x-4} \quad g(x) = \sqrt{x-4}\sqrt{x-4} \quad (f(x)+g(x)=a+b\sqrt{x+c})^2 \rightarrow$$

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

$$2x + 2(\sqrt{x^2-14x+48}) = 2x + 2(\sqrt{(x-8)^2}) \xrightarrow{\text{چون } x \geq 8} 2x + 2x - 16 \rightarrow$$

$$4x - 16 \xrightarrow{\text{تقسیم در دو طرفه}} \sqrt{4x-16} = \sqrt{4(x-4)} = 2\sqrt{x-4} \xrightarrow{\text{بسی میزنیم زیر را در یکدیگر}} \frac{a+b}{c} = \frac{2}{-4} = \boxed{\frac{-1}{2}} \quad \text{د}$$

$$f(x) = \frac{x+2}{x^2-6x+3} \quad g(x) = \{(2,1)(1,0)(3,5)(0,4)\}$$

$$f(x) = \{(2,-4)(1,\frac{3}{5})(3,\frac{5}{3})(0,\frac{2}{3})\}$$

$$\frac{g}{f} = \{(2,\frac{-1}{4})(0,4)\} \quad \text{د}$$

$$f(x) = \{(1,2)(3,-1)(4,2)(-1,4)\} \quad g(x) = \{(-2,3)(1,-1)(3,2)(-1,0)\}$$

$$f(x) = \{(\frac{1}{f},2)(\frac{4}{f},-1)(2,2)(-\frac{1}{f},4)\} \quad \text{د}$$

$$f(x^2) = \{(1,2)(-1,2)(\sqrt{4},-1)(-\sqrt{4},-1)(2,2)(-2,2)\}$$

$$19g(x)+1 = \{(-2,19)(1,4)(3,4)(-1,1)\}$$

$$\frac{2f}{g} = \{(3,-1)(-1,\frac{14}{3})(1,-4)\} \quad \text{د}$$

$$f(x) = \{(2,1)(3,1)(4,9)(-2,0)\} \quad g(x) = \{(5,1)(2,3)(-2,4)(-1,2)(3,3)\}$$

$$h = 2f + g \rightarrow \{(2,2)(3,2)(-2,4)\} \quad \text{د}$$

$$f(x) = \frac{\sqrt{3x-x}}{x-2} \quad g(x) = [x] + [-x] \rightarrow \text{به ازای } x \text{ صحیح می شود و به ازای بقیه ۱- می شود}$$

$$\left(\frac{f}{g+1}\right)(x) = \frac{\sqrt{3x-x} \rightarrow [0,4]}{x-2 \rightarrow \mathbb{R}-\{2\}} \bigwedge \frac{\mathbb{Z}}{[x]+[-x]+1 \rightarrow \mathbb{Z}} \Rightarrow \{0,1,3\} \quad \text{د}$$

$$\sqrt{3x-x} \geq 0, \sqrt{3x-x} \leq 0 \rightarrow \frac{0}{-1+1} \rightarrow [0,4] \quad \text{د}$$

↓
[0, +∞)

$f(x) = \sqrt{4x - x^2 - 4}$ $g(x) = \{(1, 2)(2, 2)(4, 4)(5, 1)\}$ $h(x) = \frac{f(x)}{g(x)} \rightarrow \{(1, 0)(2, \frac{\sqrt{2}}{2})(4, 0)(5, \sqrt{4-4})\}$ $f(x) = \{(1, 0)(2, \sqrt{2})(4, 0)(5, \sqrt{4-4})\}$	۶
برای به دست آوردن جواب به دست آورده شود! $y = x^2 - 4x^2 + 4x \rightarrow R_f = \mathbb{R}$ چون برکتی توان فرات $y = \frac{1}{x^2 - 2x} \Rightarrow \frac{y}{a}x^2 - \frac{2y}{b}x - \frac{1}{c} = 0 \rightarrow \Delta = 4y^2 + 4y \geq 0 \rightarrow 4y(y+1) \geq 0 \rightarrow$ $\frac{-1}{+} \frac{0}{-} \frac{+}{+} \rightarrow (-\infty, -1] \cup [0, +\infty)$ عبارت با فرض $y \neq 0$ درجه ۲ فرض شده است!	۷
$y = x^2 - 4x + 10 \rightarrow$ اول $x = \frac{-b}{2a} = \frac{4}{2} = 2$ $y = 9 \rightarrow R_f = [9, +\infty)$ (الف) $y = -x^2 + 4x + 2 \rightarrow$ اول $x = \frac{-b}{2a} = \frac{-4}{-2} = 2$ $y = 12 \rightarrow (-\infty, 12]$ (ب) $y = \sqrt{9x - x^2} \rightarrow$ اول $x = \frac{-b}{2a} = \frac{-9}{-2} = 4.5$ $y = 9 \rightarrow \sqrt{(-\infty, 9]} \rightarrow [0, 3]$ (د) $y = \sqrt{x^2 - 4x - 4} \rightarrow$ اول $x = \frac{-b}{2a} = \frac{4}{2} = 2$ $y = -7 \rightarrow \sqrt{[-7, +\infty)} \rightarrow [0, +\infty)$ (ج)	۸
$y = x^3 - 5x^2 + 2x + 1 \rightarrow \mathbb{R}$ $y = x^5 - 4x^2 + 3x + 2 \rightarrow \mathbb{R}$ $y = \sqrt{x^5 - 4x^2 + 3x + 2} \rightarrow \sqrt{\mathbb{R}} = [0, +\infty)$ $y = (x^5 - 4x^2 + 3x + 1)^2 \rightarrow (\mathbb{R})^2 = [0, +\infty)$	۹
$y = \frac{3x+1}{x-2} \xrightarrow{\text{با توجه به روش اول و دوم}} x = -\frac{-2y-1}{y-3} \rightarrow x = \frac{2y+1}{y-3} \rightarrow R_f = \mathbb{R} - \{3\}$ $y = \frac{2x+1}{x+1} \rightarrow x = -\frac{y-1}{y-2} = \frac{1-y}{y-2} \rightarrow R_f = \mathbb{R} - \{2\}$	۱۰

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

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

$\mathbb{R}_f = \mathbb{R}$

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

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

$y = 0 \rightarrow 0 = 1 \times$ صفتی وجود ندارد! $\rightarrow \mathbb{R}_f = (-\infty, -1] \cup (0, +\infty)$