

$$t = \sqrt{x-f} \Rightarrow t^2 = x-f, x = t^2+f \Rightarrow f(x) = \sqrt{(t^2+f)+f}t = \sqrt{(t^2+2f)t} = |t(t+2)|$$

$$g(x) = \sqrt{t^2+f-f} = \sqrt{(t-2)t} = |t-2| \Rightarrow f(x)+g(x) = t+2+t-2 = 2t$$

$$t = \sqrt{x-f} \rightarrow 2\sqrt{x-f} = a + b\sqrt{x+c} \Rightarrow \frac{(0)+2}{-f} = \left[\frac{1}{-f} \right]$$

$$f(x) = \frac{x+2}{(x-2)(x-1)} \Rightarrow D_f = \mathbb{R} - \{1, 2\} / D_g = \{1, 1, 2, 0\}$$

$$D_f \cap D_g = \{1, 0\} \rightarrow \frac{g}{f} = \left\{ \left(1, \frac{1}{-f} \right), \left(0, \frac{2}{-f} \right) \right\}$$

$$1) f(x) = \left\{ \left(\frac{1}{2}, 2 \right), \left(\frac{3}{2}, -1 \right), \left(2, 2 \right), \left(-\frac{1}{2}, 6 \right) \right\} / (-) f(x) = \left\{ (1, 2), (-1, 2(\sqrt{2}-1)), (\sqrt{2}, -1), (2, 2), (-2, 2) \right\}$$

$$g(x) = 2 \rightarrow g'(x) = 9$$

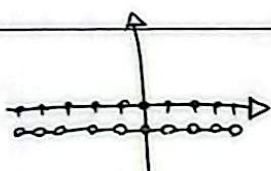
$$2) \frac{g}{f}(x) + 1 = \left\{ (-2, 1), (1, 3), (2, 9), (-1, 1) \right\} /$$

$$1 + 2g'(x) = 1 + 1 = 19$$

$$3) D_f \cap D_g = \{1, 2, -1\} \rightarrow \frac{f}{g} = \left\{ (1, -f), \left(\frac{2}{-1}, -f \right), \left(-1, -f \right) \right\} = \frac{f}{g} = \left\{ (1, -f), (2, -1) \right\}$$

$$D_f \cap D_g = \{2, 2, -1\} \rightarrow h = f+g = \left\{ (2, 5), (2, 5), (-1, 6) \right\}$$

$$J(x) = [x] + [-x] \rightarrow$$



$$+1 \rightarrow [x] + [-x] + 1$$

$$f(x) \rightarrow \textcircled{1} \sqrt{x} \rightarrow x \geq 0 / \textcircled{2} \sqrt{x} - x \geq 0 \rightarrow \dots / \textcircled{3} x - x^2 \neq 0 \Rightarrow x \neq 2$$

$$[0, 2] \setminus \{2\}$$

$$D_{\frac{f}{g+1}} = \underbrace{J(x) \cap f(x)}_{\textcircled{1}} \setminus \underbrace{\{x \mid J(x+1) = 0\}}_{\textcircled{2}} = \mathbb{R} \cap \{x \mid x \neq \mathbb{Z}\}$$

$$D_{\frac{f}{g+1}} = \{0, 1, 2\} \subseteq D_{\frac{f}{g+1}} = \{x \mid x = k, k \in [0, 2] \setminus \{2\}\} \Rightarrow k \neq \mathbb{Z}$$

$f(x) = \sqrt{-(x^2 - 5x + 4)} = \sqrt{(-x+4)(x-1)}$ $\Rightarrow D_f = [1, 4]$ و $g(x) = \{1, 2, 4, \infty\} \rightarrow D_f \cap D_g = \{1, 2, 4\}$ $h(x) = \left\{ (1, 0), (2, \frac{\sqrt{2}}{2}), (4, 0) \right\}$	6
$y = x^2 - 2x^2 + 2x + 1 - 1 = (x-1)^2 + 1 \rightarrow y-1 = (x-1)^2 \rightarrow \sqrt{y-1} = x-1$ $\Rightarrow R_f \neq \mathbb{R}$ بازن $y \neq 0$ عبارت درجه 2 فرض می‌شود! $y(x^2 - 2x) = 1 \rightarrow yx^2 - 2xy - 1 = 0 \xrightarrow{\Delta} 4y^2 + 4y = \Delta \Delta \geq 0$ $\rightarrow 4y^2 + 4y \geq 0 \rightarrow y(y+1) \geq 0 \xrightarrow{\text{نقطه بحرانی}} y = 0, -1 \Rightarrow R_g = (-\infty, -1] \cup [0, +\infty)$	7
الف) $y = x^2 - 4x + 10 \rightarrow x_s = \frac{-b}{2a} = 2, y_s = (2)^2 - 4(2) + 10 = 6 \rightarrow a > 0 \rightarrow R = [6, +\infty)$ ب.) $y = -x^2 + 4x + 3 \rightarrow x_s = 2 \rightarrow y_s = -(2)^2 + 4(2) + 3 = 12 \rightarrow a < 0 \Rightarrow R = (-\infty, 12]$ ج.) $x_s = \frac{-(-4)}{2(1)} = 2, y_s = (2)^2 - 4(2) - 3 = -7 \xrightarrow{a > 0} R = [-7, +\infty) \xrightarrow{\sqrt{\quad}} [0, +\infty) = \mathbb{R}$ د) $x_s = \frac{-6}{-2} = 3, y_s = 9 \xrightarrow{a < 0} (-\infty, 9] \xrightarrow{\sqrt{\quad}} R = [0, 3]$	8
الف) $x^{(3)} \rightarrow$ بزرگترین مرتبه فرد است $\rightarrow R = \mathbb{R}$ / ب.) $x^{(2)} \rightarrow$ فرد $\Rightarrow R = \mathbb{R}$ ج.) $\mathbb{R} =$ برد بدون رادیکال $\xrightarrow{\sqrt{\quad}} [0, +\infty) = \mathbb{R}$ د) بعد از بتوان رساندن بس $\rightarrow R = \mathbb{R}^2 \rightarrow$ بعد از بتوان رساندن بس است. $[0, +\infty)$	9
الف) $2x(-2) \neq x \rightarrow$ متغیرانیک است $\Rightarrow R_f = \mathbb{R} - \left\{ \frac{3}{2} \right\}$ ب.) $2x \neq x \rightarrow$ متغیرانیک است $\Rightarrow R_g = \mathbb{R} - \{2\}$	10

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

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

$$R_f = \mathbb{R}$$

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

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

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

$$f(n) = \left\{ \left(\frac{1}{2}, 2 \right) \left(\frac{3}{2}, -1 \right) (2, 2) \left(-\frac{1}{2}, 4 \right) \right\} \quad x \text{ های } f \text{ باید تقسیم بر ۲ شوند!} \quad (۳)$$

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

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

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