

۱۹،۵ آئین

ملاکار

$$\cancel{f(z)} g(z) = \sqrt{m+z} - \sqrt{m-z} \xrightarrow{z = \sqrt{m-r}} \sqrt{z-r} \quad \begin{matrix} m > 1 & m-r > r & \sqrt{m-r} \geq r & z \geq r \end{matrix} \quad -1$$

$$f(z) = \sqrt{m-r+r} \sqrt{z-r} \rightarrow \sqrt{(z+r)^2} \quad |z+r| = \sqrt{m-r} + r \xrightarrow{+} r\sqrt{m-r} = f(m)g(r)$$

$$\sqrt{\frac{m-r}{c}} + \frac{a}{b} = \frac{a+b}{c} = \frac{r}{-r} = \boxed{\frac{1}{-1}} \quad \text{Ⓟ}$$

$$f(m) = \frac{m+r}{m^2 - \sqrt{m} + m} \Rightarrow f(x) = \left\{ (r, -r), \left(1, \frac{r}{0}\right), \left(\frac{r}{0}, \frac{r}{0}\right), \left(0, \frac{r}{m}\right) \right\} \quad \frac{g}{f} = \left\{ \left(r, \frac{1}{-r}\right), \left(0, \frac{r}{m}\right) \right\} = \left\{ \left(r, -\frac{1}{r}\right), \left(0, \frac{r}{m}\right) \right\} \quad -2$$

$$\text{الف) } m=1 \quad n=\frac{1}{r} \Rightarrow \left(\frac{1}{r}, r\right) \rightarrow \left\{ \left(\frac{1}{r}, r\right), \left(\frac{r}{m}, -1\right), \left(\frac{r}{m}, r\right), \left(-\frac{1}{r}, r\right) \right\} \quad -3$$

$$\text{ب) } m^2=1 \quad n=\pm 1 \Rightarrow (1, r), (-1, r) \rightarrow \left\{ (1, r), (-1, r), (\sqrt{m}, -1), (\sqrt{m}, -1), (r, r), (-r, r) \right\} \quad m^2 \neq -1 \rightarrow (-1, r)$$

$$\text{ج) } r g^2(m) + 1 \xrightarrow{\frac{9}{-1}} \frac{r(m^2) + 1}{19} \Rightarrow (-r, 19) \rightarrow \left\{ (-r, 19), (1, m), (r, 9), (-1, 1) \right\}$$

$$\text{د) } \frac{r}{g} \Rightarrow \left\{ \left(1, \frac{r}{-1}\right), \left(r, \frac{-r}{m}\right), \left(-1, \frac{r}{0}\right) \right\} = \left\{ \left(1, -r\right), \left(r, -\frac{r}{m}\right) \right\} \quad \text{Ⓟ}$$

$$h = \left\{ (r, r+m), (r, r+m), (-r, 0+r) \right\} = \left\{ (r, r), (r, r), (-r, r) \right\} \quad \text{Ⓟ} \quad -5$$

$$D_g = \mathbb{R} \quad D_f = \{m \geq 0 \mid m \geq 0 \mid \sqrt{m} \geq m \mid m \geq m^2 \mid 0 \geq m^2 - m \mid [0, 1^m] \mid m \geq 0 \mid A \Rightarrow [0, 1^m] = D_f\}$$

$$g+1 \neq 0 \Rightarrow D_g \stackrel{B}{=} \mathbb{R} - \mathbb{Z} \Rightarrow R_g = -1 \times \quad \mathbb{Z} \cap [0, 1^m] \Rightarrow D\left(\frac{f}{g+1}\right) = \{0, 1, 2, \dots, m\}$$

$$g \neq -1 \Rightarrow D_g = \mathbb{Z} \quad R_g = 0 \Rightarrow g \quad g \neq -1 \quad \checkmark$$

$$f(m) = \sqrt{am - m^2 - r} \quad \Rightarrow \sqrt{a - r} = a \Rightarrow (1, 0) \quad f(m) = \{(1, 0), (2, \sqrt{r}), (r, 0), (a, \sqrt{a-r})\}$$

$$h(m) = \{(1, \frac{a}{m}), (2, \frac{\sqrt{r}}{r}), (r, \frac{0}{r})\} = \{(1, 0), (2, \frac{\sqrt{r}}{r}), (r, 0)\}$$

الف) $m^3 - m^2 + m - 1 + 1 \Rightarrow y = (m-1)^3 + 1 \quad y-1 = (m-1)^3 \quad \sqrt[3]{y-1} + 1 = m \rightarrow \mathbb{R}$

$\Delta \geq 0 \Rightarrow$ برای هر m در $\mathbb{R}$ یک جواب دارد $\Delta \geq 0 \Rightarrow$ $4y^2 + 4y \geq 0 \Rightarrow y^2 + y \geq 0 \Rightarrow y \in (-\infty, -1] \cup [0, +\infty)$

$\rightarrow ym^2 - 2ym = 1 \quad ym^2 - 2ym - 1 = 0 \quad \Delta = 4 + 4y = 4(y+1) \geq 0 \Rightarrow y \geq -1$

$y = 0 \rightarrow 0 = 1 \times$

به ازای $y = 0$ عبارت n حقیقی ندارد!

الف) $y = \frac{m^2 - 4m + 4 - 4 + 4}{(m-2)^2}$ $y-4 = (m-2)^2$ $\sqrt{y-4} = m-2$ $m = \sqrt{y-4} + 2$ $y-4 \geq 0$
 $\boxed{y \geq 4}$

ب) $-y = m^2 - 4m - 3 \Rightarrow -y = \frac{m^2 - 4m - 3 + 12 - 12}{(m-2)^2}$ $\Rightarrow 12 - y = (m-2)^2 \Rightarrow \sqrt{12-y} = m-2$ $\Rightarrow 12-y \geq 0$
 $\sqrt{12-y} = (m-2)$ $\boxed{12-y}$

ج) $y = \frac{m^2 - 4m - 3 + 4 - 4}{(m-2)^2}$ $y+4 = (m-2)^2$ $\sqrt{y+4} = m-2$ $\boxed{y+4 \geq 0}$ $y \geq -4$ $\boxed{y \geq 0}$

د) $-y = \frac{m^2 - 4m + 4 - 4}{(m-2)^2}$ $9-y = (m-3)^2$ $\sqrt{9-y} = m-3$ $9-y \geq 0$ $9 \geq y$ $y = \sqrt{m}$ $y \geq 0$
 $\boxed{9 \geq y}$ $\boxed{y \geq 0}$ $\boxed{0 \leq y \leq 9}$ **دقت!**

الف) $\mathbb{R}$ $\mathbb{R} - \mathbb{R}^- = [0, +\infty)$ $\mathbb{R} - \mathbb{R}^- = [0, +\infty)$

الف) $\mathbb{R} - \{3\}$ $\mathbb{R} - \{2\}$ $\mathbb{R} - \{\frac{a}{a}\}$ $\mathbb{R} - \{1\}$

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

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

$R_f = \mathbb{R}$

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

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

$y = 0 \rightarrow 0 = 1 \times$ صفتی وجود ندارد! $\rightarrow R_f = (-\infty, -1] \cup (0, +\infty)$

الف- ۸) $y = n^2 - 2n + 1 \rightarrow \min \begin{cases} n = \frac{2}{2} = 1 \\ y = 1 - 2 + 1 = 0 \end{cases} \rightarrow R_f = [0, +\infty)$

ب- ۸) $y = -n^2 + 4n + 3 \rightarrow \max \begin{cases} n = \frac{-4}{-2} = 2 \\ y = -9 + 18 + 3 = 12 \end{cases} \rightarrow R_f = (-\infty, 12]$

ج- ۸) $y = n^2 - 2n - 3 \rightarrow \min \begin{cases} n = \frac{2}{2} = 1 \\ y = 1 - 2 - 3 = -4 \end{cases} \rightarrow R_f = \sqrt{[-4, +\infty)} = [-2, +\infty)$

د- ۸) $y = 4n - n^2 \rightarrow \max \begin{cases} n = \frac{-4}{-2} = 2 \\ y = 8 - 4 = 4 \end{cases} \rightarrow R_f = \sqrt{(-\infty, 4]} = (-\infty, 2]$