

مسئله عقاری

①

$$R(a^3 - 5) \rightarrow (a^3 - 5, +\infty)$$

$$R(12a - 20) \rightarrow (-\infty, 12a - 20]$$

$$\Rightarrow 12a - 20 \leq a^3 - 5 \rightarrow a^3 - 5 - 12a + 20 \geq 0$$

$$a^3 - 12a + 15 \geq 0$$

$$\textcircled{2} \begin{array}{c|c|c|c} 1 & 0 & -12 & 15 \\ \hline 1 & 12 & -1 & 0 \end{array}$$

$$\Rightarrow (a - 1)(a^2 + 12a - 15) = (a - 1)(a + 5)(a - 3) \geq 0$$

$$\begin{array}{c|c|c} -5 & 1 & 3 \\ \hline - & + & + \end{array}$$

$$\Rightarrow a = [-5, +\infty)$$

$$f(n) = 2n + K, \quad f^{-1}(2) = 5 \rightarrow 2(5) + K = 2$$

②

5

$$\Rightarrow 10 + K = 2 \Rightarrow K = -8 \Rightarrow f(n) = 2n - 8$$

$$\text{الف) } f(5) = 2 \times 5 - 8 = 10 - 8 = \boxed{2}$$

$$\text{ب) } f(f(n)) = 2(2n - 8) - 8 = 4n - 16 - 8 = \boxed{4n - 24}$$

$$f(m) = \frac{am}{n-1} \rightarrow f(a) = \frac{a^r}{a-1} = ra$$

(3)

5

$$a^r = ra^r - ra \rightarrow a^r - ra = 0 \Rightarrow a = 0, r$$

$$f^{-1}(m) = y = \frac{am}{n-1} \rightarrow n = \frac{ay}{y-1} \rightarrow ny - n = ay \rightarrow ny - ay = n$$

$$\Rightarrow f\left(\frac{y-a}{n}\right) = n \rightarrow y = \frac{n}{n-a} \xrightarrow{n=ra} \frac{ra}{ra-a} = a$$

$a \neq 0$

$$\Rightarrow \boxed{a=r}$$

$$f^{-1}(m) = \{(\omega, r)(v, r)(r, v)(q, q)\}$$

(4)

$$g^{-1}(m) = \{(r, r)(q, 1)(\omega, q)\}$$

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$$a) f \circ f^{-1} = f(f^{-1}(m)) = \{(\omega, \omega)(v, v)(r, r)(q, q)\}$$

$$b) f^{-1}(f(m)) = \{(r, r)(q, q)(v, v)(\omega, \omega)\}$$

$$c) f(g^{-1}(m)) = \{(r, \omega)(\omega, q)\}$$

$$g) g^{-1}(f(m)) = \{(r, q)(v, r)(q, 1)\}$$

$$g^{-1} = \{(1, r)(r, q)(\omega, q)\}$$

(5)

$$f(g^{-1}(m)) = \{(1, q)(r, 1)(\omega, \omega)\}$$

5

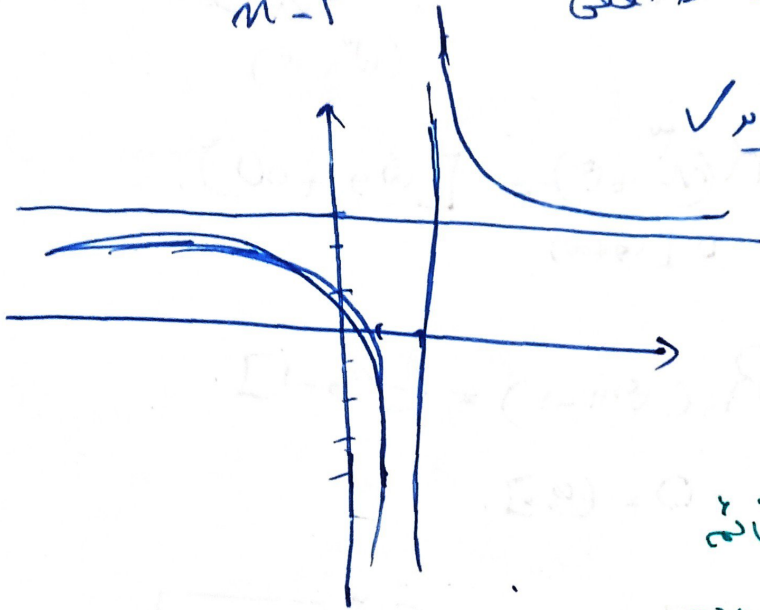
$$f \circ g^{-1} = \{(1, \frac{r}{r})(r, \frac{q}{1})(\omega, \frac{1}{\omega})\}$$

④

$$y = \frac{2m+1}{n-2}$$

مجاہد قائم = 2
افقی = 3

$$y = \frac{2m+1}{n-2}$$



مکروس نیز
مکروس

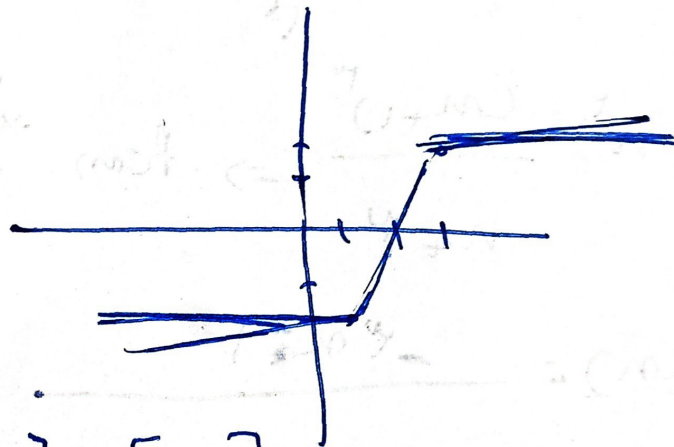
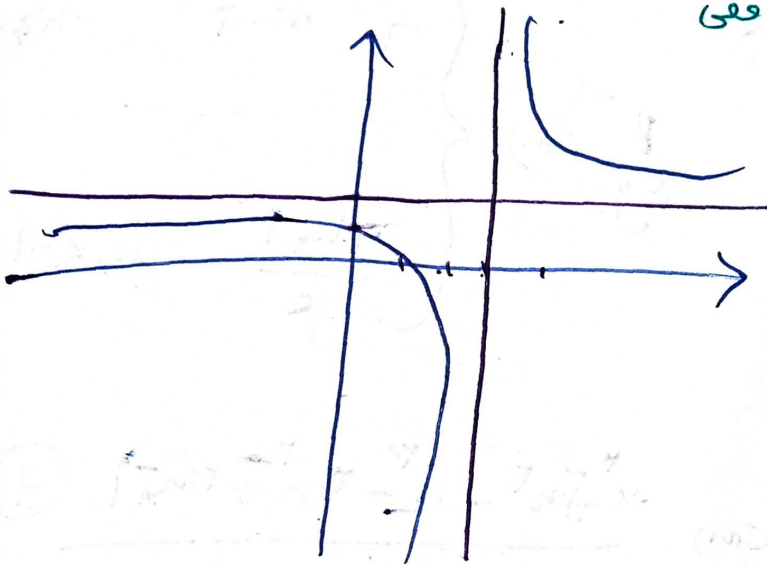
$$\Rightarrow n = \frac{2y+1}{y-2} = 2$$

$$y = \frac{2m+1}{n-2}$$

مجاہد قائم = 3

افقی = 2

5



⑤

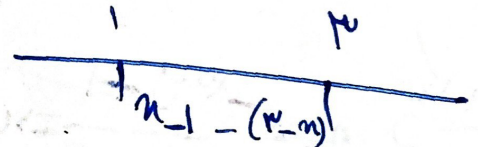
$$f(m) = (m-1) - (m-2)$$

$$n = 1, 2$$

$$[a, b] = [1, 2]$$

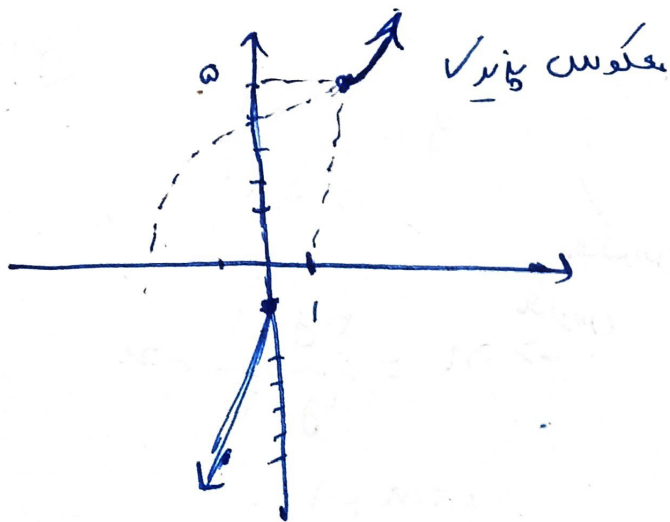
$$y = 2m - 1 \Rightarrow n = 2y - 1$$

$$\Rightarrow 2y = n + 1 \Rightarrow y = \frac{n+1}{2}$$



$$y = n-1 + n-2 = 2m-3$$

5



$$R(n^r + \epsilon) = D \quad \text{مركب} \quad (1)$$

$(n^r + \epsilon)$

$$R(n^r + \epsilon) = [\omega_0 + \infty)$$

$D [194\infty)$

$$R(\epsilon n - 1) = (-\infty, -1]$$

$D = [\infty, \infty]$

$$y = n^r + \epsilon \quad \text{مركب} \quad \rightarrow \quad n = y^r + \epsilon$$

$$\Rightarrow y^r = n - \epsilon \Rightarrow y = \sqrt[r]{n - \epsilon}$$

$$y = \epsilon n - 1 \quad \text{مركب} \quad \rightarrow \quad n = \epsilon y - 1 \Rightarrow \epsilon y = f^{-1}(n) \quad \left\{ \begin{array}{l} \sqrt[r]{n - \epsilon} \quad n \geq \omega \\ \frac{n+1}{\epsilon} \quad n \leq -1 \end{array} \right.$$

$$\Leftrightarrow \epsilon y = n + 1 \Rightarrow y = \frac{n+1}{\epsilon}$$

$$f(n) = n^r - \frac{(n+1)^r}{n + \epsilon} \Rightarrow f(n) = \frac{n^r + n^r - n^r - \epsilon n^r + n + 1}{n + \epsilon} \quad (4)$$

$$\Rightarrow f(n) = \frac{-\epsilon n + 1}{n + \epsilon} \rightarrow y = \frac{-\epsilon n + 1}{n + \epsilon} \rightarrow$$

$$\text{مركب} \rightarrow n = \frac{-\epsilon y + 1}{y + \epsilon} = n \Rightarrow y = \frac{-\epsilon n + 1}{n + \epsilon} \Rightarrow y = \frac{-\epsilon n - 1}{n + \epsilon}$$

$$= y = \frac{-\epsilon n - 1}{\epsilon n + 1} \rightarrow f^{-1}(-1) = \frac{-\epsilon(-1) - 1}{\epsilon - 1} = \frac{1 - 1}{1} = 0$$

$$y = \frac{n}{n^2+1} \xrightarrow{\text{مکروس}} n = \frac{y}{y^2+1} \rightarrow ny^2 + n = y \rightarrow ny^2 - y + n = 0 \quad (10)$$

$$\Delta = 1 - 4n^2$$

$$y = \frac{1 \pm \sqrt{1-4n^2}}{2n} \quad 1-4n^2 \geq 0 \quad 4n^2 \leq 1 \quad n^2 \leq \frac{1}{4} \Rightarrow n \leq \frac{1}{2}$$

$$\Rightarrow -\frac{1}{2} < n \leq \frac{1}{2}$$

$$\frac{n}{n^2+1} \xrightarrow{n=1} y = \frac{1}{2} \quad \& \quad \checkmark \quad (2)$$

برای تابع اولی به ازای 1، $\frac{1}{2}$ به دست می آید
 منظور به ازای تابع اصلی به ازای 1، $-\frac{1}{2}$ به دست می آید
 به ازای 1، $\frac{1}{2}$ به دست می آید

$$f^{-1}(n) = \begin{cases} \frac{1 + \sqrt{1-4n^2}}{2n} & n < \frac{1}{2} \\ \frac{1 - \sqrt{1-4n^2}}{2n} & -\frac{1}{2} < n < 0 \end{cases}$$