

* تالیف سوال: $\frac{1}{x}$

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$$① f(1-x) - xf(x) = 2x+1 \rightarrow \text{مستقیم می‌گذاریم}$$

①

$$\hookrightarrow f(x) + xf(1-x) = 2x+1$$

$$② xf(x) + x^2 f(1-x) = 2x^2 + x \xrightarrow{①+②} f(1-x) + x^2 f(1-x) = 2x+1 + 2x^2 + x$$

$$\rightarrow f(1-x)(x^2+1) = 2x^2 + 2x+1 \rightarrow f(1-x) = \frac{2x^2 + 2x+1}{x^2+1}$$

$$f(x) = \frac{2x^2 - 2x+1}{x^2+1}$$

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

②

$$2f(0) = 1 \rightarrow f(0) = \frac{1}{2} \rightarrow f(x) = x^2 - 2x + \frac{1}{2} \rightarrow f(x^2) = x^4 - 2x^2 + \frac{1}{2}$$

$$y = \frac{x^4 + x + \frac{1}{2}}{x-1} \text{ (با } \frac{0}{0} \text{)} \rightarrow yx - y = x^4 - x - \frac{1}{2} = 0 \rightarrow$$

③

$$x^4 + x(1-y) + \frac{1}{2}y = 0 \rightarrow x = \frac{-b \pm \sqrt{\Delta}}{2a} \rightarrow x = \frac{y-1 \pm \sqrt{y^2 - y + 1 - \frac{1}{4}y}}{2}$$

$$y^4 - 4y - 1 \geq 0 \rightarrow \begin{array}{c|c|c} + & 0 & - & 0 & + \\ \hline -1 & & & & 1 \end{array} \rightarrow R_y = [-\infty, -1] \cup [1, +\infty)$$

④

$$\text{الف) } y = x^4 - 2x + 1 \rightarrow \text{علا} \begin{cases} -\frac{b}{2a} = \frac{\omega}{2} \\ x(\frac{\omega}{2}) - (\frac{\omega}{2}) + 1 = -\frac{14}{\omega} \end{cases}$$

$$\min \rightarrow R_f = [-\frac{14}{\omega}, +\infty)$$

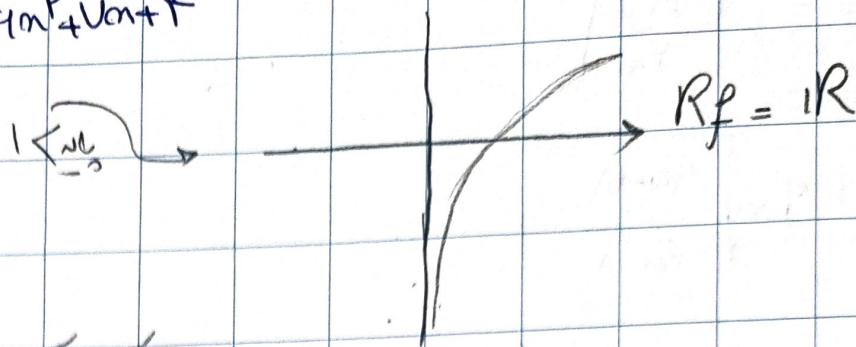
$$\text{ب) } y \leq \sqrt{-x^4 + 4x - \omega} \rightarrow$$

$$\text{علا} \begin{cases} -\frac{b}{2a} = \frac{\omega}{2} \\ -9 + 11 - \omega \leq \frac{\omega}{2} \end{cases}$$

$$\max \rightarrow R_y = \sqrt{(-\infty, \frac{\omega}{2})} = [0, \frac{\omega}{2}]$$

$$\text{ج) } y \leq \sqrt{x^4 - 2x^2 + 2x + 1} \rightarrow R_f = \sqrt{1R} = [0, +\infty)$$

$$2) y = \log_{n^k - 4n^k + 4n + k}$$



$$الف) y = \frac{kx+1}{kx-4} \xrightarrow{\text{مقلوب}} R_f = IR - \left\{ \frac{1}{k} \right\}$$

$$ب) y = \sqrt{\frac{kx+1}{x-k}} \xrightarrow{\text{مقلوب}} R_f = \sqrt{IR - \{k\}} \rightarrow R_f = [0, +\infty) - \{k\}$$

$$ج) y = \frac{n^k + k}{\sqrt{n^k + k}} = \frac{\sqrt{n^k + k} + 1}{\sqrt{n^k + k}} \xrightarrow{n=0} \frac{\sqrt{k+1}}{\sqrt{k}} = \frac{k\sqrt{k}}{k}$$

$$R_y = \left[\frac{k\sqrt{k}}{k}, +\infty \right)$$

$$د) y = n^k + \frac{1}{n^k + k} + k - k \rightarrow \text{min} = k + \frac{1}{k} = \frac{k^2 + 1}{k} \xrightarrow{-k} \frac{1}{k}$$

$$R_y = \left[\frac{1}{k}, +\infty \right)$$

$$y = \frac{kx^2 + k}{-k \frac{x^2 - 1}{k}} \xrightarrow{\text{مقلوب}}$$

$$y n^2 - y = k n^2 + k \rightarrow$$

$$n^2(y - k) = k y \rightarrow n = \pm \sqrt{\frac{y+k}{y-k}}$$

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

$$R_f = (-\infty, -k] \cup (k, +\infty)$$

$$\text{نقطه}$$

$$n^2 \rightarrow +\infty \rightarrow -k$$

$$\left. \begin{array}{l} +\infty \\ -k \end{array} \right\} \xrightarrow{\text{مقلوب}} R_f = (-\infty, -k] \cup (k, +\infty)$$

$$f(x) = \frac{k \sin x + k}{\sin x - k}$$

$$\xrightarrow{\sin x \in [-1, 1]} \left[\begin{array}{l} +1 \rightarrow -k \\ -1 \rightarrow \frac{-1}{k} \end{array} \right]$$

$$R_f = \left[-k, -\frac{1}{k} \right]$$

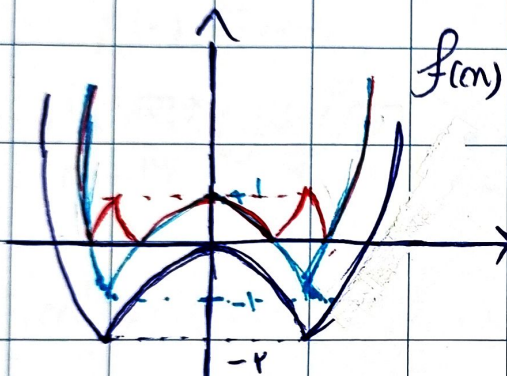
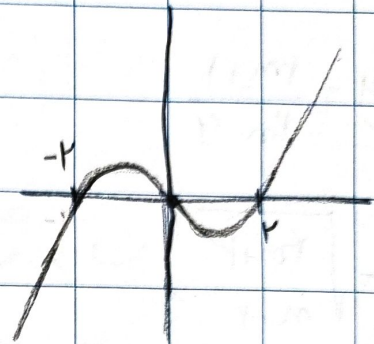
الف) $g = \left| \frac{m-1}{m} \right|$ همنوع $y = \frac{3}{x}$ ①

$R_g = [0, +\infty)$

ب) $y = \sqrt{\frac{4m-11}{m-1}} = \frac{4(m-2)}{m-1} \xrightarrow{m \neq 2} y = \frac{3}{x} \rightarrow R_f = \left\{ \frac{3}{x} \right\}$

$y = m|m| - 2m \rightarrow \begin{cases} m \geq 0 : m^2 - 2m \\ m < 0 : -m^2 - 2m \end{cases}$

$R_g = \mathbb{R}$



① ابل قدر صطلن موال اعمال م كننم كه تابع به شكل قبل فرماد.

② ميسن تابع رايد و واحد بارام بريم.

③ ميسن قدر صطلن حور كل ضابطه را مبرن كننم.

الكل شكل مبرن:

