

دینا سقایی

$$\begin{aligned} \lim_{n \rightarrow \infty} \begin{cases} f(-n) - x f(n) = 2|n| + 1 \\ f(n) + x f(-n) = 2|-n| + 1 \end{cases} & \begin{cases} -n f(-n) + n^2 f(n) = -x(2|n| + 1) - 1 \\ f(n) + n f(-n) = 2|n| + 1 \end{cases} \end{aligned}$$

$$f(n)(1+n^2) = (2|n|+1)(1-n)$$

$$f(n) = \frac{(2|n|+1)(1-n)}{1+n^2} \checkmark$$

دینا سقایی

$$n=0 \rightarrow 2f(0) = 4 \rightarrow f(0) = 2$$

$$f(n^2) + 3 = n^2 - 2n^2 + 4 \rightarrow f(n^2) = n^2 - 2n^2 + 4 \checkmark \quad (2)$$

$$y^n - y = n^2 + n + 2$$

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

$$(1-y)^2 - 4(2+y) \geq 0 \rightarrow y^2 + 1 - 2y - 1 - 4y \geq 0$$

$$y^2 - 4y - 4 \geq 0 \quad \begin{array}{c} \text{---} \\ \text{---} \\ \text{---} \\ \text{---} \end{array}$$

$$y \leq -1 \cup y \geq 5 \checkmark$$

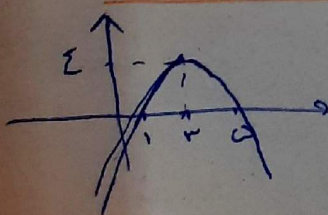
$$S \mid \frac{0}{x}$$

$$x \times \frac{2x}{x^2} - \frac{2x^2}{x^2} + 1 = \frac{2x - 2x^2 + 1}{x} = -\frac{14}{x}$$

(ع - اف)

$$R_f = \left[-\frac{14}{x}, +\infty\right)$$

(2)



$$\sqrt{[0, 2]} = [0, 2] \checkmark$$

(ج)

$$R_g = (-\infty, +\infty) \quad R_f = [0, +\infty)$$

(ج - ٤)

$$f(x) = \log_{10} x$$

$$R_g = (-\infty, +\infty)$$

$$R_f = (-\infty, +\infty)$$

(د - ٤)

$$x = \frac{4x+1}{x-1}$$

$$R_f = \left\{ \frac{x}{x-1} \right\}$$

(د - الف)

$$R_f = [0, +\infty) - \{1\}$$

راه حل!!

(د - ب)

$$y = \frac{x^2 + x + 1}{\sqrt{x^2 + x}} = \sqrt{x^2 + x} + \frac{1}{\sqrt{x^2 + x}}$$

(د - ج)

$$\sqrt{x^2 + x} < +\infty \quad \sqrt{x^2 + x} + \frac{1}{\sqrt{x^2 + x}} = \frac{x}{\sqrt{x^2 + x}}$$

$$R_f = \left[\frac{x}{\sqrt{x^2 + x}}, +\infty \right)$$

$$x^2 + \varepsilon + \frac{1}{x^2 + \varepsilon} - \varepsilon$$

(د - ب)

$$\frac{1}{2} \leq x^2 + \varepsilon < +\infty \quad \frac{1}{2} \leq x^2 + \varepsilon + \frac{1}{x^2 + \varepsilon} < +\infty$$

$$\frac{1}{\varepsilon} \leq x^2 + \varepsilon + \frac{1}{x^2 + \varepsilon} - \varepsilon < +\infty$$

$$R_f = \left[\frac{1}{\varepsilon}, +\infty \right)$$

$$\frac{3D+2}{D-1} \quad \begin{cases} D=0 \rightarrow \frac{2}{-1} = -2 \\ D=+\infty \rightarrow 3 \end{cases}$$

(د - ٢)

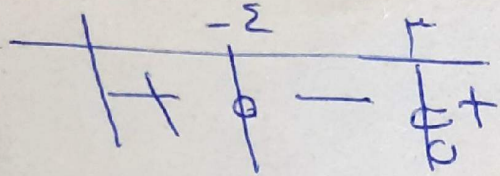
$$(-\infty, -2) \cup (3, +\infty)$$

نقطه ٢:

$$y n^r - y = r n^r + \varepsilon$$

4 - ریش اصلی

$$\rightarrow -y - \varepsilon = n^r (r - y) \rightarrow n^r = \frac{y + \varepsilon}{y - r} \xrightarrow{y=0} n = \pm \sqrt{\frac{y + \varepsilon}{y - r}}$$



$$\textcircled{R} = (r, +\infty) \cup (-\infty, -2]$$

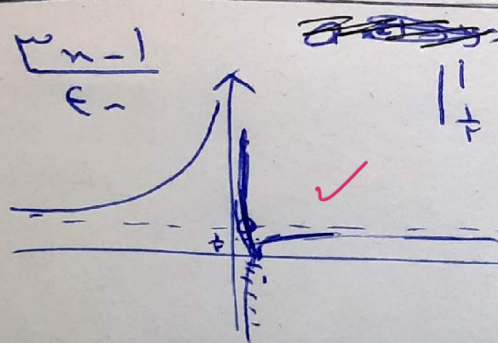
$$y = \frac{rD + r}{D - r}$$

فصلانه صفر ندارد $\leftarrow D_{\min} = r$

$$\begin{cases} D = -1 \rightarrow \frac{-r + \varepsilon}{-\varepsilon} = 8 = \frac{1}{r} \\ D = 1 \rightarrow \frac{4}{-1} = -2 \quad \textcircled{2} \end{cases} \rightarrow V$$

$$R_f = [-2, -\frac{1}{r}]$$

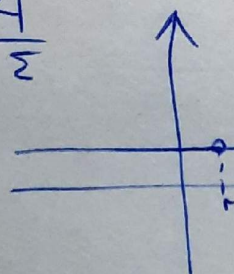
$$y = \frac{r(n-1)}{\varepsilon - 1}$$



1 - الف $\textcircled{2}$

$$R_{\text{الف}} = [0, +\infty)$$

$$\sqrt{\frac{9(n-r)}{r(n-r)}} = \frac{3}{2}$$

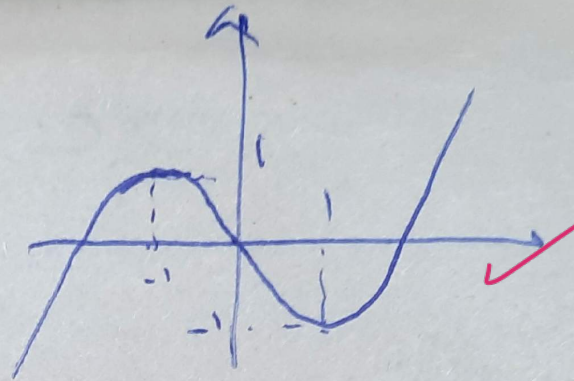


1 - ج

$$y = \frac{r}{3} = \frac{r}{3}$$

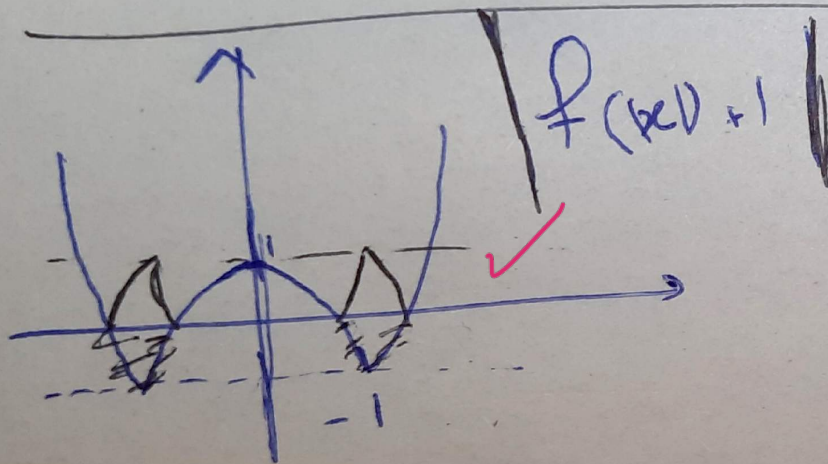
$$R_c = \left(\frac{r}{3}, r \right)$$

$$\begin{cases} n^2 - 1 & n \geq 1 \\ -n^2 - 1 & n \leq 0 \end{cases}$$



(1) - 9

$$R_f = (-\infty, +\infty)$$



(1) - 10

۵- برد توابع محوّنرّنیف $\mathbb{R} - \{\frac{a}{c}\}$ است

الف $R_y = \mathbb{R} - \{\frac{y}{2}\}$

ب $R_y = \sqrt{\mathbb{R} - \{4\}} = [0 + \infty) - \{2\}$