

$$f(-n) - af(n) = 2|n| + 1 \quad / \quad a \rightarrow -a \rightarrow f(-(-n)) + af(n) = 2|n| + 1$$

$$f(n) + af(n) = 2|n| + 1$$

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

$$x \rightarrow -x \rightarrow -af(-n) - n^2 f(n) = 2n|n| + a$$

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

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

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

$$f(n) + f(0) = n^2 - 2n + 4 \quad / \quad a \rightarrow 0 \rightarrow 2f(0) = 4 \rightarrow f(0) = 2$$

$$f(n) + 2 = n^2 - 2n + 4 \rightarrow f(n) = n^2 - 2n + 2 \quad f(n^2) = \underline{n^4 - 2n^2 + 2}$$

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$$y = \frac{n^2 + a + 4}{n - 1} \rightarrow ay - y = n^2 + a + 4 \rightarrow n^2 + a(1 - y) + 4 = 0$$

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

$$(y - 5)(y + 1) \geq 0 \quad \frac{-1}{2} \leq y \leq 5$$

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$$R_f = \mathbb{R} - (-1, 5)$$

$$\text{الف) } y = \frac{n^2 - 2n + 4}{n - 1} \rightarrow \min \rightarrow a > 0$$

$$n_s = \frac{-b}{2a} = \frac{0}{2} = 0 \rightarrow y_s = \frac{-11}{1}$$

$$R_f = \left(\frac{-11}{1}, +\infty \right)$$

$$\text{ب) } y = \sqrt{n^4 - 2n^2 + 4n + 1} \rightarrow \text{توان فرد}$$

$$(-\infty, +\infty) = (-\infty, +\infty) \quad \text{پایان}$$

$$\rightarrow y = \sqrt{-n^2 + 4n - 5}$$

$$n_s = 2, y_s = 1$$

$$\sqrt{(-\infty, 4]} = [0, 2] \rightarrow R_f$$

$$\text{د) } \log(n^2 - 4n^2 - 4n + 2)$$

$$\rightarrow R_f = \mathbb{R}$$

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$$\text{الف) } y = \frac{n+1}{n-4} \rightarrow \text{صورت کسری}$$

$$R = \left(\frac{a}{c} \right)$$

$$\frac{a}{c} = \frac{1}{1} \rightarrow R_f = \mathbb{R} - \left(\frac{1}{1} \right)$$

$$\text{ب) } y = \frac{n^2 + 1}{\sqrt{n^2 + 1}} = \sqrt{n^2 + 1} = \frac{1}{\sqrt{n^2 + 1}}$$

$$n \rightarrow 0 \rightarrow \sqrt{1 + \frac{1}{n^2}} \quad R_f = \left(\frac{1}{1}, +\infty \right)$$

$$\text{الف) } y = \sqrt{\frac{n+1}{n-1}} \rightarrow A - \frac{a}{c} = A - \left(\frac{1}{1} \right)$$

$$\sqrt{A - \left(\frac{1}{1} \right)} = (0, +\infty) = \left(\frac{1}{1} \right) \rightarrow R_f$$

$$\text{ب) } y = n^2 + \frac{1}{n^2 + 1} \pm 1, n^2 + \frac{1}{n^2 + 1} = 1$$

$$n \rightarrow 0 \rightarrow 1 + \frac{1}{1} = 2 \rightarrow \frac{1}{2}$$

$$R_f = \left(\frac{1}{2}, +\infty \right)$$

$$y = \frac{r^2 + 1}{r^2 - 1} \rightarrow \text{قسم 2} = y \cdot r^2 - y = r^2 + 1 \rightarrow (r^2 - 1)r^2 + y = 0 \quad (1)$$

$$R_f \cdot R = (-1, 1) \cup \frac{-1}{1 - r^2} \cup \frac{r^2 - 1}{r - y} \geq 0$$

$$y = \frac{r^2 + 1}{r^2 - 1} \rightarrow \text{قسم 1} \rightarrow r^2 \rightarrow +\infty \rightarrow \frac{r^2 + 1}{r^2 - 1} \rightarrow 1 \quad (2)$$

$$r^2 \rightarrow 0 \rightarrow \frac{1}{-1} = -1 \rightarrow \text{منفرد می تواند منفرست شود}$$

$$R_f = (-\infty, -1] \cup (1, +\infty)$$

$$f(m) = \frac{1 \sin m + 1}{\sin m - 1} \rightarrow \sin m = 1 \rightarrow \frac{1 + 1}{1 - 1} = -1$$

$$\sin m = -1 = \frac{-1 + 1}{-1 - 1} = -\frac{1}{1}$$

$$\sin m - 1 = 0 \rightarrow \sin m = 1 \rightarrow \text{منفرد می تواند منفرست شود}$$

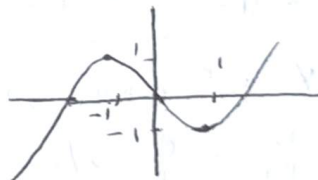
$$R_f = [-1, \frac{-1}{1}]$$

$$\text{الف) } y = \left| \frac{r^2 - 1}{r^2} \right| \rightarrow |R - \left(\frac{r}{1} \right)| \rightarrow y = \sqrt{\frac{r^2 - 1}{-1 + r^2}} \cdot \frac{r(r^2 - 1)}{r^2(r^2 - 1)}$$

$$= (0, +\infty) - \left(\frac{r}{1} \right) = R_f$$

$$\sqrt{\frac{r}{1}} = \frac{r}{1}$$

$$y = m |r| - 1 \rightarrow \begin{cases} m \geq 0 \rightarrow r^2 - 1 \\ m < 0 \rightarrow -r^2 - 1 \end{cases}$$



$$R_f = \mathbb{R}$$

$$f(m)$$

$$f(l(m))$$

$$f(m) + 1$$

$$y = |f(l(m)) + 1|$$

