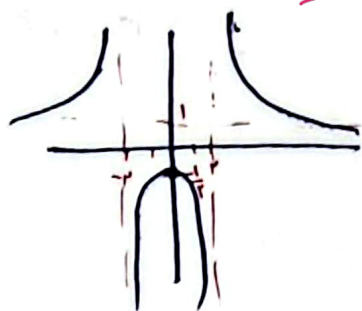


الف)  $\frac{x+1}{x-2} \xrightarrow{x \geq}$

$\frac{-x+1}{-x-2} \xrightarrow{x \leq}$



$R_f = (-\infty, -\frac{1}{3}] \cup (1, +\infty)$

(۲)

ب)  $\frac{x^2+1}{|x|} = |x| + \frac{1}{|x|} \Rightarrow [2, +\infty)$

صفت ریبیل

$y x^2 + y^2 + x^2 + y^2 - 2 \Rightarrow x^2 + (y-1)^2 - (y+1)^2$

$(x-y)^2 - 4(1) - (y+1)^2 \leq y^2 + 1 + y^2 + 2y + 1$

$y \leq -2 \Rightarrow R_f = (-\infty, -2] \cup [2, +\infty)$

$x^2 - x + 1 \rightarrow \Delta < 0 \Rightarrow R_f \leq R$

$y(x^2 - x + 1) \leq x^2 - x + \frac{1}{y} \Rightarrow (y-1)x^2 - (y-1)x + (y - \frac{1}{y})$

$\Rightarrow (y-1)^2 - 4(y-1)(y - \frac{1}{y}) \geq 0 \Rightarrow 0 \leq y \leq 1$

$\Rightarrow R_f \leq [0, 1]$

$\frac{1}{y} = \frac{3}{4} \Rightarrow y = \frac{4}{3}$

در واقع به غریب آینه‌ها صفت شود یعنی  $y \neq 1$  است  
مخاطره (آینه): و تبع در انزای هیچ مقداری برابر نیست پس برد بگیر است؛

$R_y = [0, 1]$

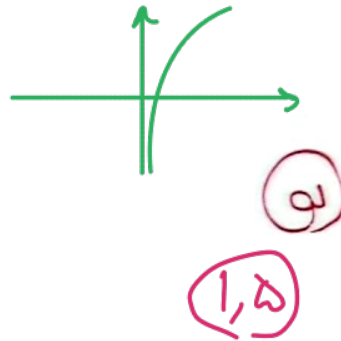
الف)  $\frac{-\Delta}{4a} \leq 3 \Rightarrow 0 \leq -x^2 + 4x - 1 \leq 3 \Rightarrow 0 \leq y \leq \sqrt{3}$

$R_f \leq [0, \sqrt{3}]$

ب)  $\frac{-\Delta}{4a} \geq -1 \Rightarrow [-1, +\infty) \xrightarrow{f} [2, +\infty)$

برد توابع چندجمله‌ای از مرتبه فرد برابر  $\mathbb{R}$  می‌باشد:

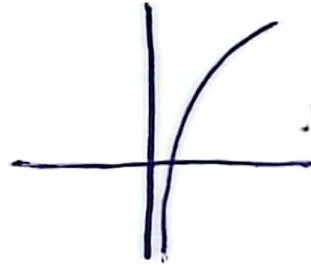
$$R_y = \log(-\infty, +\infty) = \log(0, +\infty) = (-\infty, +\infty) = \boxed{\mathbb{R}}$$



همیشه مثبت نیست!

~~$x^2 - x + 1$~~  است

همواره



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

چندجمله‌ای مرتبه فرد بردش  $\mathbb{R}$  است

ب)  $\frac{x^2+1}{x}, x \neq \frac{1}{x} \Rightarrow x \in [1, +\infty)$

$\Rightarrow \log_2^2 \leq \log_2^4 \Rightarrow \boxed{[1, +\infty)}$

صعودی است

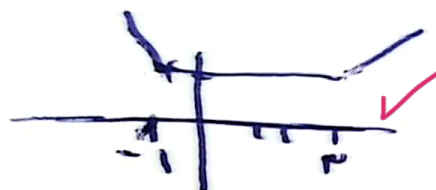
الف)

$$n < 1 \Rightarrow -n - 1$$

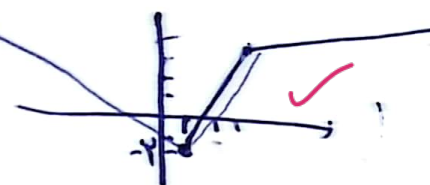
$$1 \leq n < 3 \Rightarrow n - 2$$

$$n \geq 3 \Rightarrow n + 1$$

ب)



$$R_F = [\varepsilon, +\infty)$$



$$R_F = [-2, +\infty)$$

(2) (1)

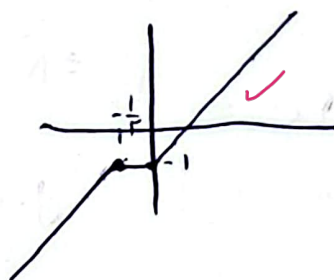
النتيجة

|                    |                              |
|--------------------|------------------------------|
| $-1$               | $\psi$                       |
| $n+1 < 1$          | $-n-1 < 1$                   |
| $n < -\psi$        | $n > -\frac{1}{\psi}$        |
| $[-\infty, -\psi]$ | $[-\frac{1}{\psi}, +\infty)$ |

$$\Rightarrow R_F = (-\infty, -\psi] \cup [-\frac{1}{\psi}, +\infty)$$

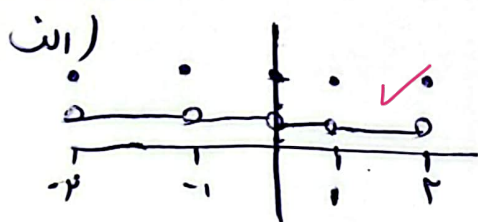
(2) (1)

|                   |              |
|-------------------|--------------|
| $-\frac{1}{\psi}$ | $0$          |
| $f_{n+1}$         | $\psi_{n-1}$ |
| $-1$              |              |



$$R_F = \mathbb{R}$$

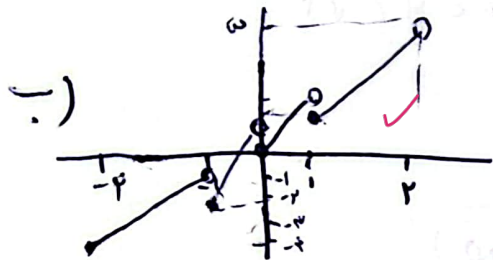
(2) (1)



$$[n] + [-n] + \psi$$

$$R_F = \{\psi\}$$

(2) (1)



$$\begin{aligned} 0 \leq n < 1 &\rightarrow \psi_n \\ 1 \leq n < 2 &\rightarrow \psi_{n-1} \\ -1 \leq n < 0 &\rightarrow \psi_{n+1} \\ -2 \leq n < -1 &\rightarrow \psi_{n+2} \end{aligned}$$

$$R_{Y_S} = [-1, \infty)$$

$$\text{النتيجة } -\frac{b}{\psi a} \leq \frac{1}{\psi} \Rightarrow F\left(\frac{1}{\psi}\right) \leq \frac{1}{\psi} - \frac{1}{\psi} + 1 = \frac{\psi}{\psi}$$

$$F(1) \leq 1$$

(2) (1)

$$\Rightarrow R_F = \left[-\frac{\psi}{\psi}, \psi\right]$$

$$\Rightarrow \frac{b}{\psi a} \leq \frac{1}{\psi} \Rightarrow F(1) \leq \psi \Rightarrow R_F = [1, \psi]$$