

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

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

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

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

$$2f(1) = 4 \quad f(1) = 2 \quad f(n) = n^2 - 2n + 2$$

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

$$y = \frac{n^2 + n + 2}{n-1} \quad y - y = n^2 + n + 2 \quad n^2 + (1-y)n + 2+y$$

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

$$\begin{aligned} y^2 - 2y + 1 - 4y - 8 &> 0 \\ y^2 - 6y - 7 &> 0 \\ (y-7)(y+1) &> 0 \\ \frac{-1}{+} & \frac{7}{+} \end{aligned}$$

$$R_f = (-\infty, -1] \cup [7, +\infty)$$

$$\text{ب) } y = 2n^2 - \omega n + 1 \quad \text{ent} \left| \frac{\frac{\omega}{2}}{\frac{2\omega}{1}} - \frac{2\omega}{1} + 1 = \frac{-\omega}{1} \right. \quad R_f = \left[-\frac{1}{2}, +\infty \right)$$

$$\text{ج) } y = \sqrt{-n^2 + 4n - 4} \quad \text{ent} \left| \begin{matrix} 1 \\ 1 \end{matrix} \right. \rightarrow (+\infty, 1) \xrightarrow{\sqrt{}} [0, 2]$$

$$\text{د) } y = \sqrt{n^2 - 2n^2 + (n+1)^2} \rightarrow \mathbb{R} \xrightarrow{\sqrt{}} [0, +\infty)$$

$$\text{هـ) } y = (x^2 - 4n^2 + \sqrt{n+1}) \quad R_f = \mathbb{R}$$

$$\text{و) } R_f = \mathbb{R} - \left\{ \frac{2}{e} \right\}, \quad \mathbb{R} - \left\{ \frac{2}{e} \right\}$$

$$\text{ز) } \mathbb{R} - \{1\} \xrightarrow{\sqrt{}} [0, +\infty) - \{1\}$$

$$\text{ح) } \frac{n^2 + n + 1}{\sqrt{n^2 + 2}} = \sqrt{n^2 + 2} + \frac{1}{\sqrt{n^2 + 2}} \quad \omega = \sqrt{2} \rightarrow \sqrt{2} + \frac{1}{\sqrt{2}}, \quad \frac{n+1}{\sqrt{2}} > \frac{2\sqrt{2}}{1}$$

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

$$ج) \quad n^2 + 1 + \frac{1}{n^2 + 1} - 1 \rightarrow \left[\frac{1}{n^2} + \infty \right] \xrightarrow{-1} \left[\frac{1}{n^2} + \infty \right)$$

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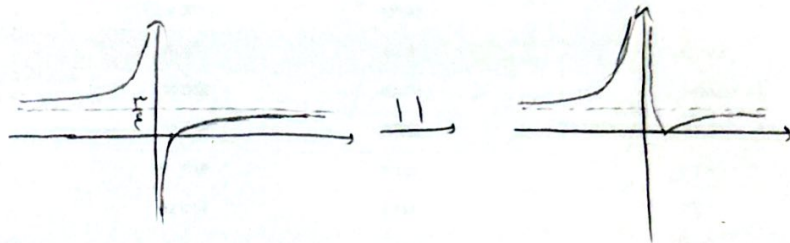
$$y = n^2 - 1 = n^2 + 1 \quad (n-1)n^2 + 1 + y = \dots \quad n^2 = \frac{-(1+y)}{n-1} = \frac{y+1}{y-1}$$

$$n = \pm \sqrt{\frac{y+1}{y-1}} \quad \frac{-1}{+1} \quad R_f = (-\infty, -1] \cup (1, +\infty)$$

$$\frac{n^2 + 1}{n^2 - 1} \quad \begin{matrix} \text{max} = \infty \\ \text{min} = -1 \end{matrix} \quad \text{مخرج منفرد} \quad R_f = (-\infty, -1] \cup (1, +\infty)$$

$$\frac{2 \sin n + 1}{\sin n - 1} \quad \begin{matrix} \text{max} = 1 \\ \text{min} = -1 \end{matrix} \quad \begin{matrix} \frac{2}{-1} = -2 \\ \frac{1-1}{-1} = 0 \end{matrix} \quad \text{مخرج منفرد} \quad R_f = [-2, 0]$$

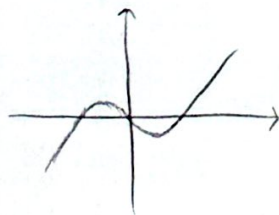
$$الف) \quad y = \left| \frac{n-1}{n} \right|$$



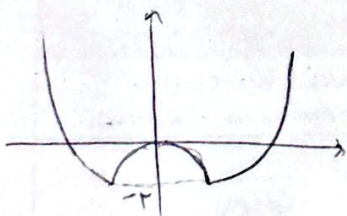
$$R_f = \mathbb{R}$$

$$ب) \quad y = \sqrt{\frac{n-1}{n-1}} = \sqrt{\frac{1}{n}} = \frac{1}{\sqrt{n}} \quad R_f = \left\{ \frac{1}{\sqrt{n}} \right\}$$

$$y = \begin{cases} n^2 - 2n & n > 0 \\ -n^2 - 2n & n < 0 \end{cases}$$



$$R_f = \mathbb{R}$$



$$|n|$$

هنا شكل مثلثي
منخفض الرأس
مفتوح من الأسفل

$$+1$$

