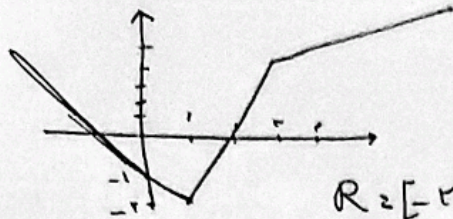


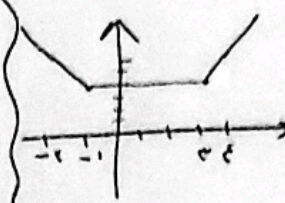
الف) $a = z \quad z \geq 0, z \neq 2 \quad y = \frac{z+1}{z-2}$ $y(z-2) = z+1 \rightarrow yz - 2y = z+1 \rightarrow z(y-1) = 2y+1 \rightarrow z = \frac{2y+1}{y-1}$ $z \geq 0 \Rightarrow \frac{2y+1}{y-1} \geq 0 \quad y = -\frac{1}{2} \text{ یا } 1 \rightarrow y \leq -\frac{1}{2} \text{ یا } y > 1 \Rightarrow (-\infty, -\frac{1}{2}] \cup (1, +\infty)$ ب) $a \neq 0 \rightarrow z = a > 0 \rightarrow a^2 = a ^2 = z^2 \rightarrow y = \frac{z+1}{z} = 1 + \frac{1}{z} \xrightarrow{z \geq 0} z + \frac{1}{z} \geq 2 \Rightarrow z + \frac{1}{z} - 2 = \frac{(z-1)^2}{z} \geq 0 \quad (z=1) \quad [2, +\infty)$	
$a \neq 2 \rightarrow y(a+2) = a^2 + 2a - 2 \rightarrow a^2 + (2-y)a - (2+2y) = 0$ $\Delta \geq 0 \Rightarrow (2-y)^2 + 4(2+2y) \geq 0 \rightarrow y^2 + 8y + 12 \geq 0 \rightarrow (y+4)(y+3) \geq 0$ $\Rightarrow y \leq -4 \text{ یا } y \geq -3 \Rightarrow (-\infty, -4] \cup [-3, +\infty)$	۲
داده $\rightarrow m^2 - m + 1 = (m - \frac{1}{2})^2 + \frac{3}{4} \rightarrow (m - \frac{1}{2})^2 + \frac{3}{4} > 0 \Rightarrow D = \mathbb{R}$ بر $\rightarrow m^2 - m + \frac{1}{2} = (m - \frac{1}{2})^2 \rightarrow f(m) = \frac{(m - \frac{1}{2})^2}{(m - \frac{1}{2})^2 + \frac{3}{4}} \xrightarrow{z = (m - \frac{1}{2})^2 \geq 0} \frac{z}{z + \frac{3}{4}}$ $\frac{z}{z + \frac{3}{4}} \xrightarrow{z \geq 0} y \geq 0 \quad \text{منه} \rightarrow 0 \leq y < 1 \rightarrow m = \frac{1}{2} \vee m \neq 1$ $\rightarrow R = [0, 1)$	۳
الف) $\rightarrow -m^2 + 5m - 1 = (m^2 - 5m + 4) + 2 \rightarrow m - (m-2)^2$ $m - (m-2)^2 \geq 0 \rightarrow 0 < y < 2 \xrightarrow{f} 0 \leq y \leq \sqrt{3} \rightarrow R = [0, \sqrt{3}]$ ب) $2m^2 - 8m = 2(m^2 - 4m) = 2[(m-2)^2 - 4] \rightarrow 2(m-2)^2 - 8$ $\rightarrow (m-2)^2 \geq 0 \rightarrow 2(m-2)^2 - 8 \geq -8 \rightarrow 2m^2 - 8m \in [-8, +\infty)$ $\sqrt{1} \cdot \sqrt{1} = 1 \rightarrow R = [-2, +\infty)$	۴
الف) $\rightarrow$ برآن $\rightarrow$ هر دو منفرد $\rightarrow$ چون درجه ۲ (الف) ب) $\frac{a^2+1}{a} > 0 \rightarrow a^2+1 > 0 \rightarrow a > 0 \rightarrow \frac{a^2+1}{a} = a + \frac{1}{a} \xrightarrow{a > 0}$ $\rightarrow a + \frac{1}{a} \geq 2 \rightarrow \frac{a^2+1}{a} \in [2, +\infty) \rightarrow [2, 2\sqrt{2}, +\infty) \rightarrow [1, +\infty)$	۵

$$\text{الف) } \begin{array}{c|ccc} 0 & 1 & 2 & 3 \\ \hline -1 & -2 & 3 & 0 \end{array}$$



$$R_2[-2, 3]$$

$$\text{ب) } \begin{array}{c|ccc} -1 & -2 & 3 & 0 \\ \hline 0 & 1 & 2 & 3 \end{array}$$



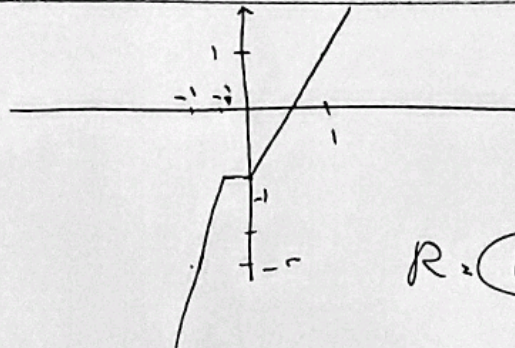
$$R_2[1, 3]$$

$$n = -2 \text{ or } 2 \xrightarrow{n \leq -1} |n-2| = 2-n \rightarrow (n-2) - (n+2) = -4$$

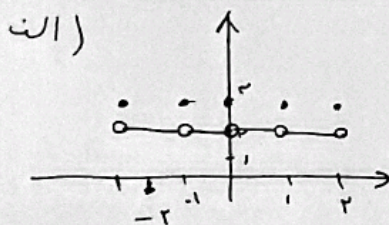
$$\rightarrow \varepsilon \leq 1 \rightarrow \emptyset$$

$$\begin{aligned} \xrightarrow{-2 \leq n \leq 2} |n-2| = 2-n &\rightarrow 2-n - (n+2) \leq 1 \rightarrow -2n \leq 1 \rightarrow -\frac{1}{2} \leq n \leq 2 \\ |n+2| = n+2 &\rightarrow (n-2) - (n+2) = -4 \rightarrow -4 \leq 1 \checkmark \rightarrow [-\frac{1}{2}, 2] \end{aligned}$$

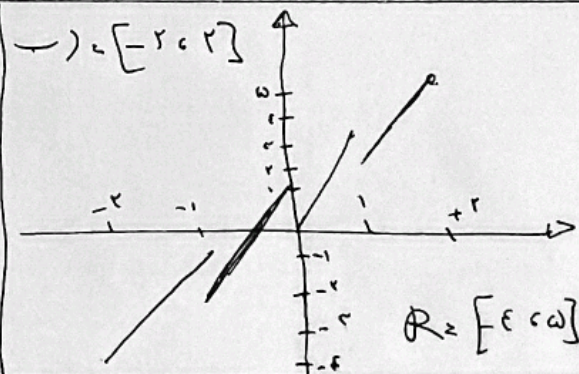
$$\begin{array}{c|ccc} -1 & -\frac{1}{2} & 0 & 1 \\ \hline -2 & -1 & -1 & 1 \end{array}$$



$$R_2(\mathbb{R})$$



$$R_2\{2, 3\}$$



$$R_2[1, 2]$$

$$\text{الف) } \begin{array}{c|c} -1 & 2 \\ \hline 1 & 1 \\ \hline \frac{1}{2} & \frac{1}{2} \end{array} \rightarrow \left(\frac{1}{2}\right)^2 - \frac{1}{2} + 1 \rightarrow \frac{1}{4} - \frac{1}{2} + 1 = \frac{3}{4} \Rightarrow R_2\left[\frac{3}{4}, 2\right]$$

$$\text{ب) } \begin{array}{c|c} 1 & 2 \\ \hline 0 & 1 \\ \hline -\frac{1}{2} & -\frac{1}{2} \end{array} \rightarrow R_2[1, 2]$$