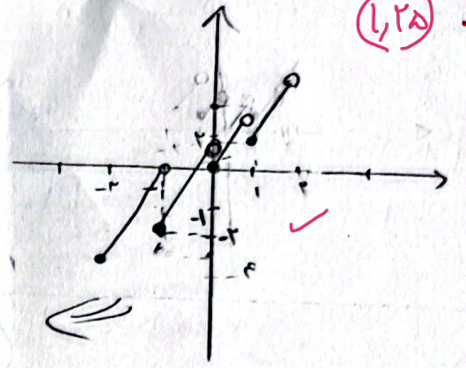
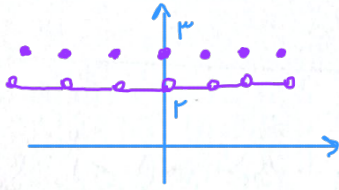


$$\Rightarrow R_x = \{2, 3\}$$



(1, 2.5) - 9

$$y = [x] + [-x] + r$$



$$R_x = [-f, \omega]$$

$$\begin{aligned} & \begin{aligned} & \xrightarrow{1} 1 - 1 + 1 = 1 \\ & \xrightarrow{-1} 1 + 1 + 1 = 3 \end{aligned} \\ & \Rightarrow \left[\frac{1}{f}, 3 \right] = R_f \\ & \xrightarrow{-\frac{b}{f_a}} = \frac{1}{f} = \sin u \\ & \therefore \text{سینک } y \end{aligned}$$

$$\begin{aligned} & \begin{aligned} & \xrightarrow{1} 1 + 1 + 1 = 3 \\ & \xrightarrow{0} 1 \end{aligned} \\ & \Rightarrow R_f = \left[-\frac{1}{f}, 3 \right] \\ & \xrightarrow{-\frac{b}{f_a}} = -\frac{1}{f} = \sin u \end{aligned}$$

الف

$$y = \sin^r u - \sin^r u + 1$$

$$\sin^r u = -1 \rightarrow y = 3$$

$$\sin^r u = 1 \rightarrow y = 1$$

$$\sin^r u = \frac{-b}{f_a} = \frac{1}{f} \rightarrow y = \frac{r}{f}$$

$$\left. \begin{aligned} & y = 3 \\ & y = 1 \\ & y = \frac{r}{f} \end{aligned} \right\} R_y = \left[\frac{r}{f}, 3 \right]$$

$$y = \sin^f u + \sin^r u + 1$$

ب

$$\sin^r u = 0 \rightarrow y = 1$$

$$\sin^r u = 1 \rightarrow y = 3$$

$$\sin^r u = \frac{-b}{f_a} = -\frac{1}{f} \rightarrow y = \frac{r}{f}$$

$$\left. \begin{aligned} & y = 1 \\ & y = 3 \\ & y = \frac{r}{f} \end{aligned} \right\} R_y = [1, 3]$$

$$\text{الف) } \max \left| \begin{array}{l} \frac{-b}{2a} = 2 \\ y = 3 \end{array} \right| \Rightarrow R_y = \sqrt{(-\infty, 3]} = [0, \sqrt{3}]$$

-۴

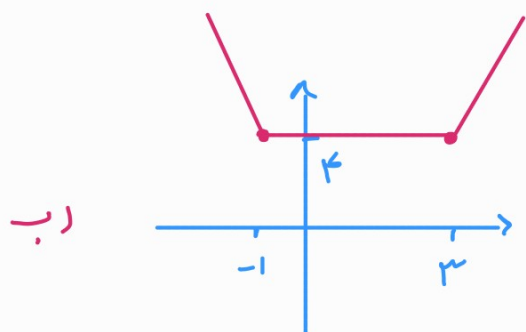
$$\text{ب) } \min \left| \begin{array}{l} \frac{-b}{2a} = 2 \\ y = -1 \end{array} \right| \Rightarrow R_y = \sqrt{[-1, +\infty)} = [-2, +\infty)$$

-۵

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

$$R_y = \text{Im}(-\infty, +\infty) = \mathbb{R}$$

-۶



تابع قطعه‌ای $\Rightarrow R_y = [2, +\infty)$

-۷

$$\begin{cases} -x-4 & x \geq 2 \\ -3x & -1 \leq x \leq 2 \\ x+4 & x \leq -1 \end{cases}$$

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

