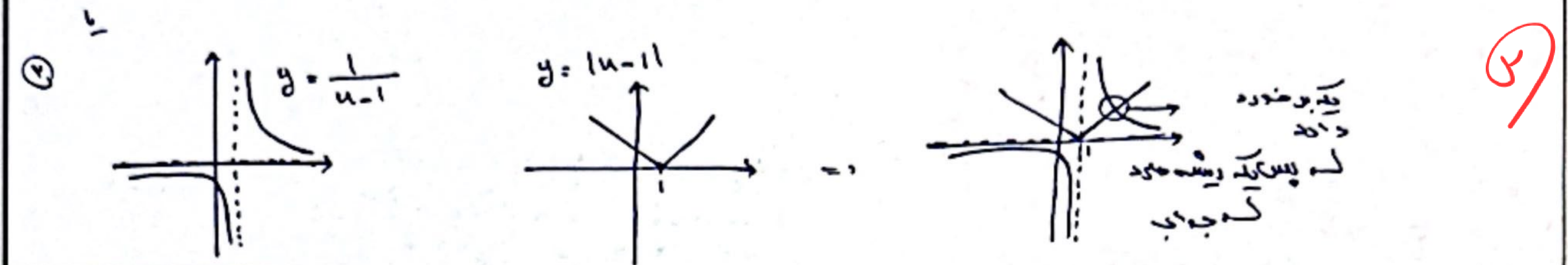
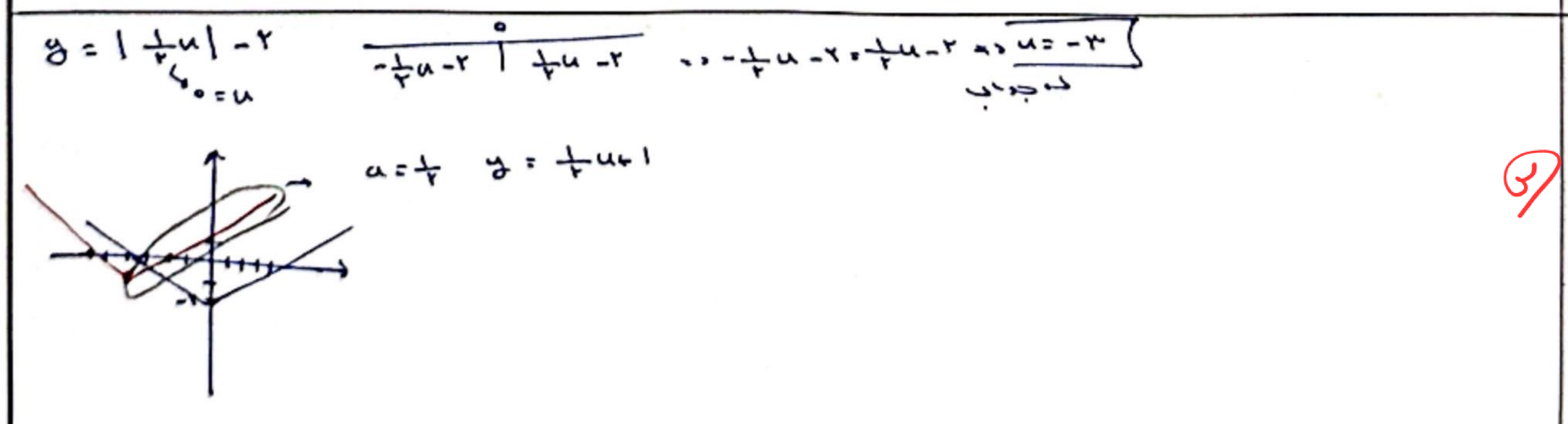
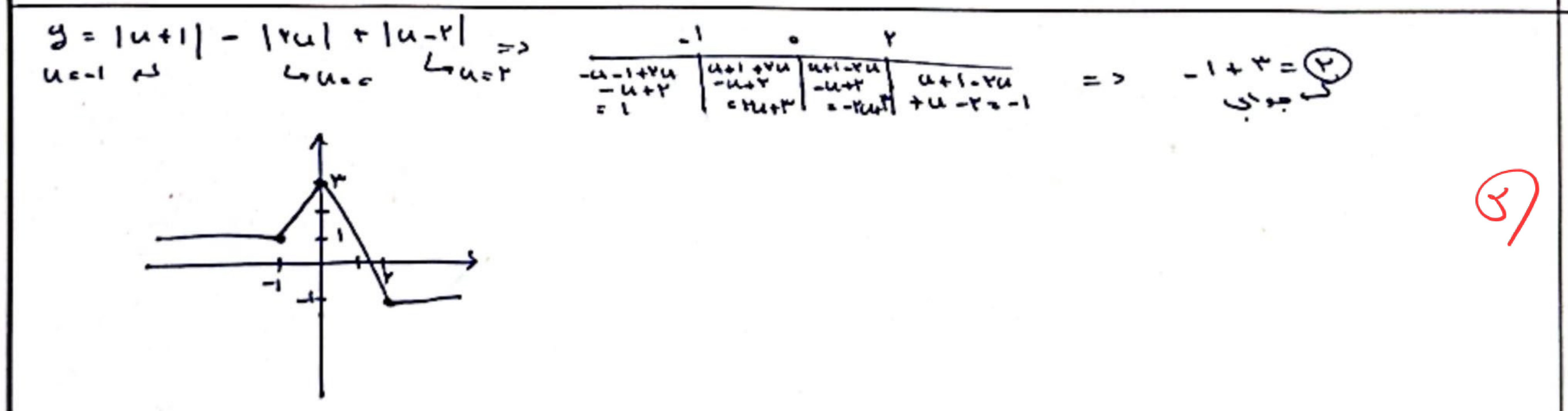


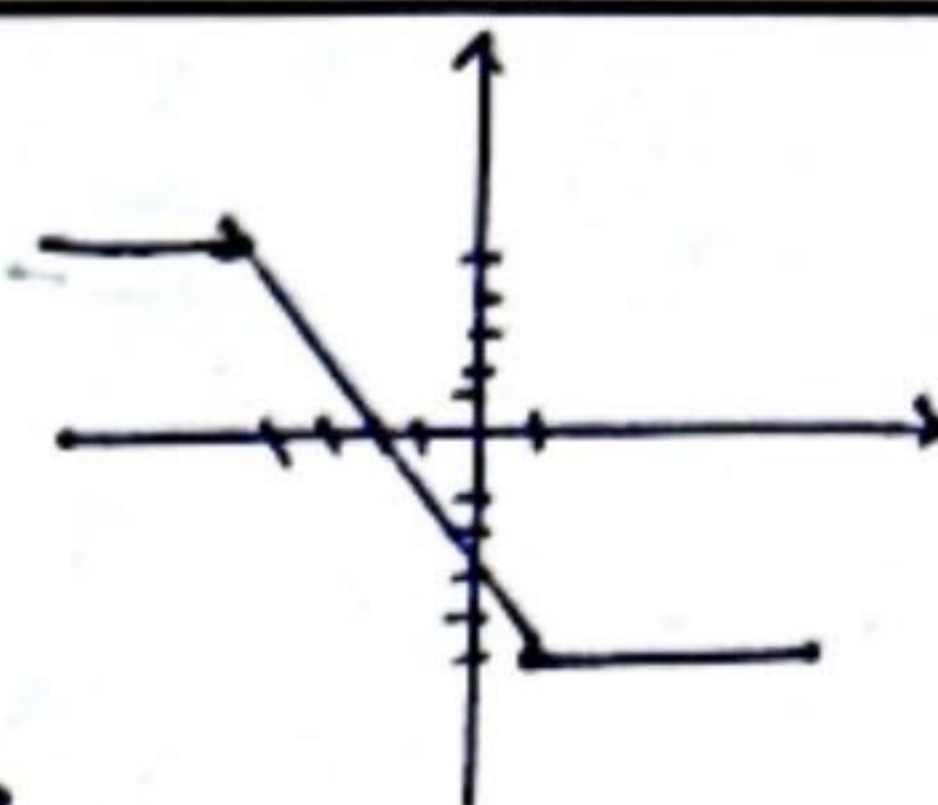
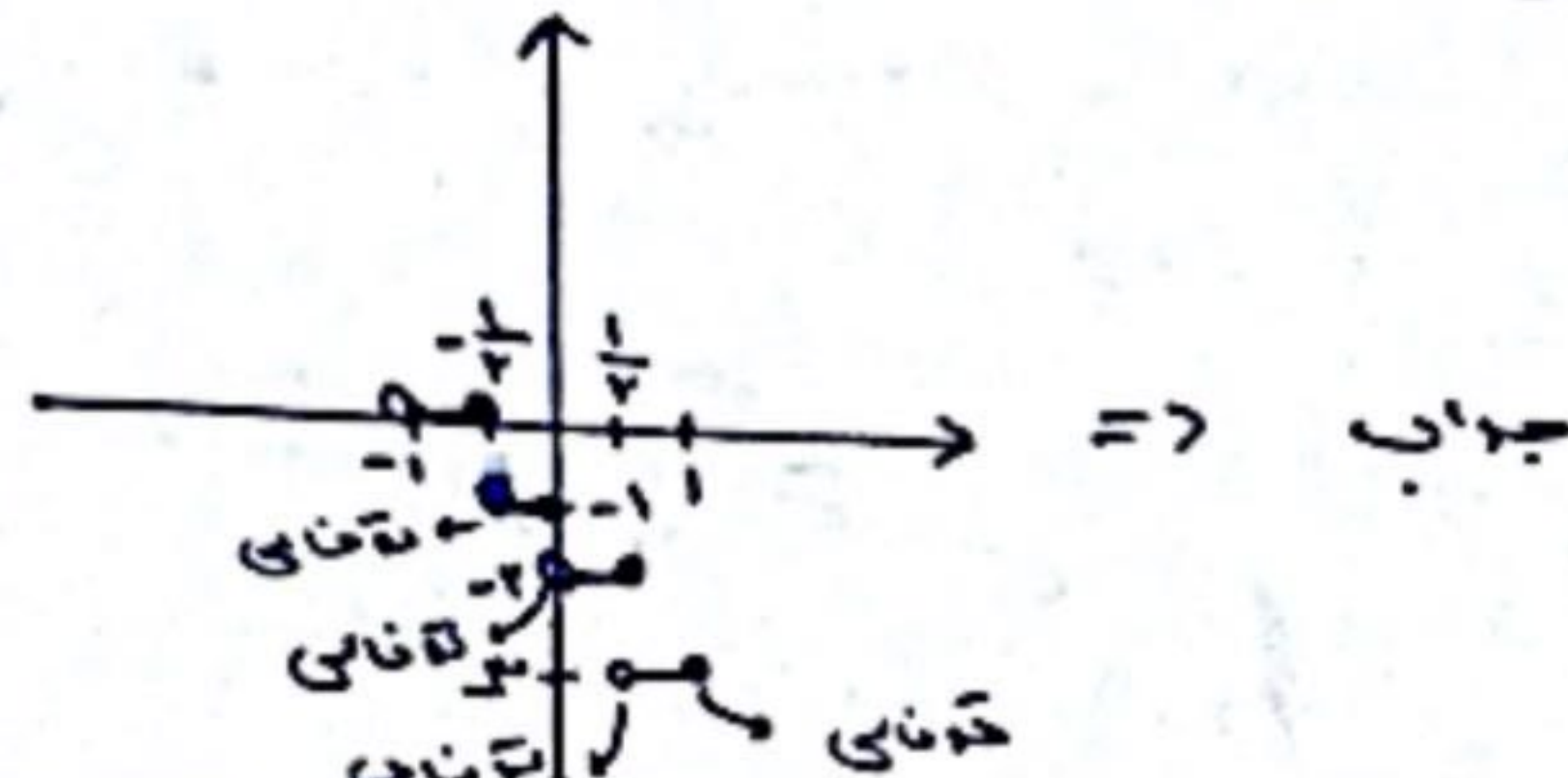
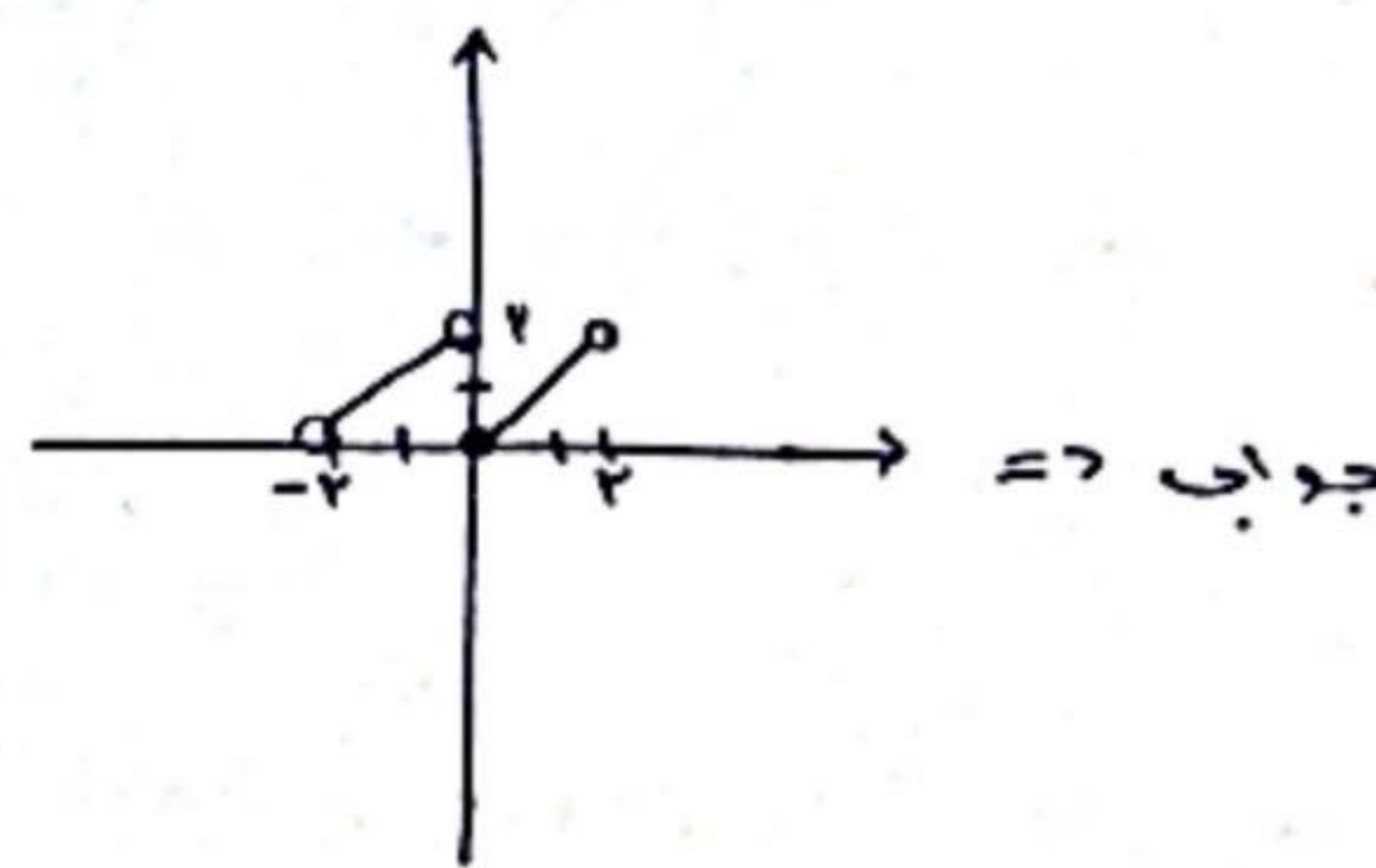
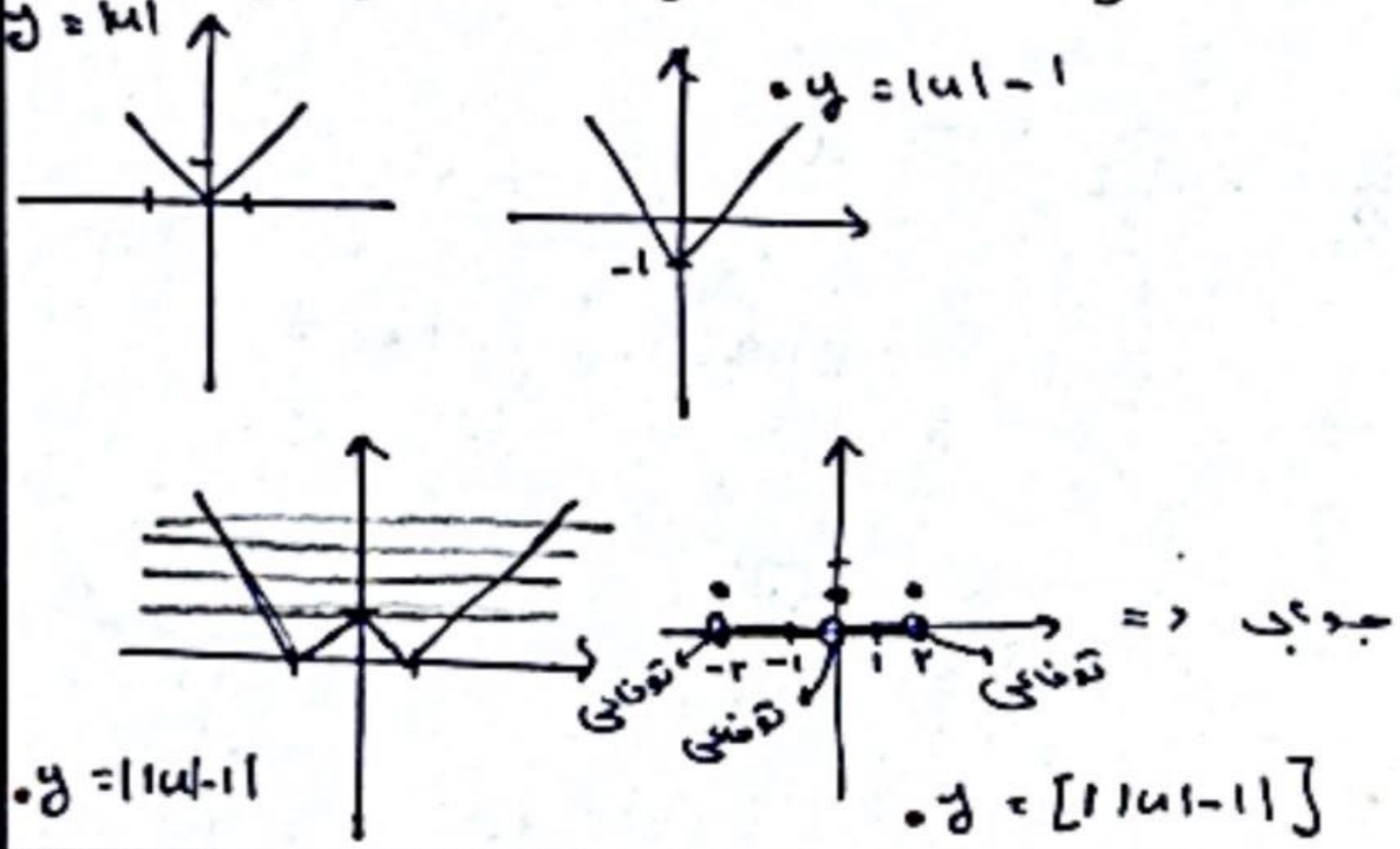
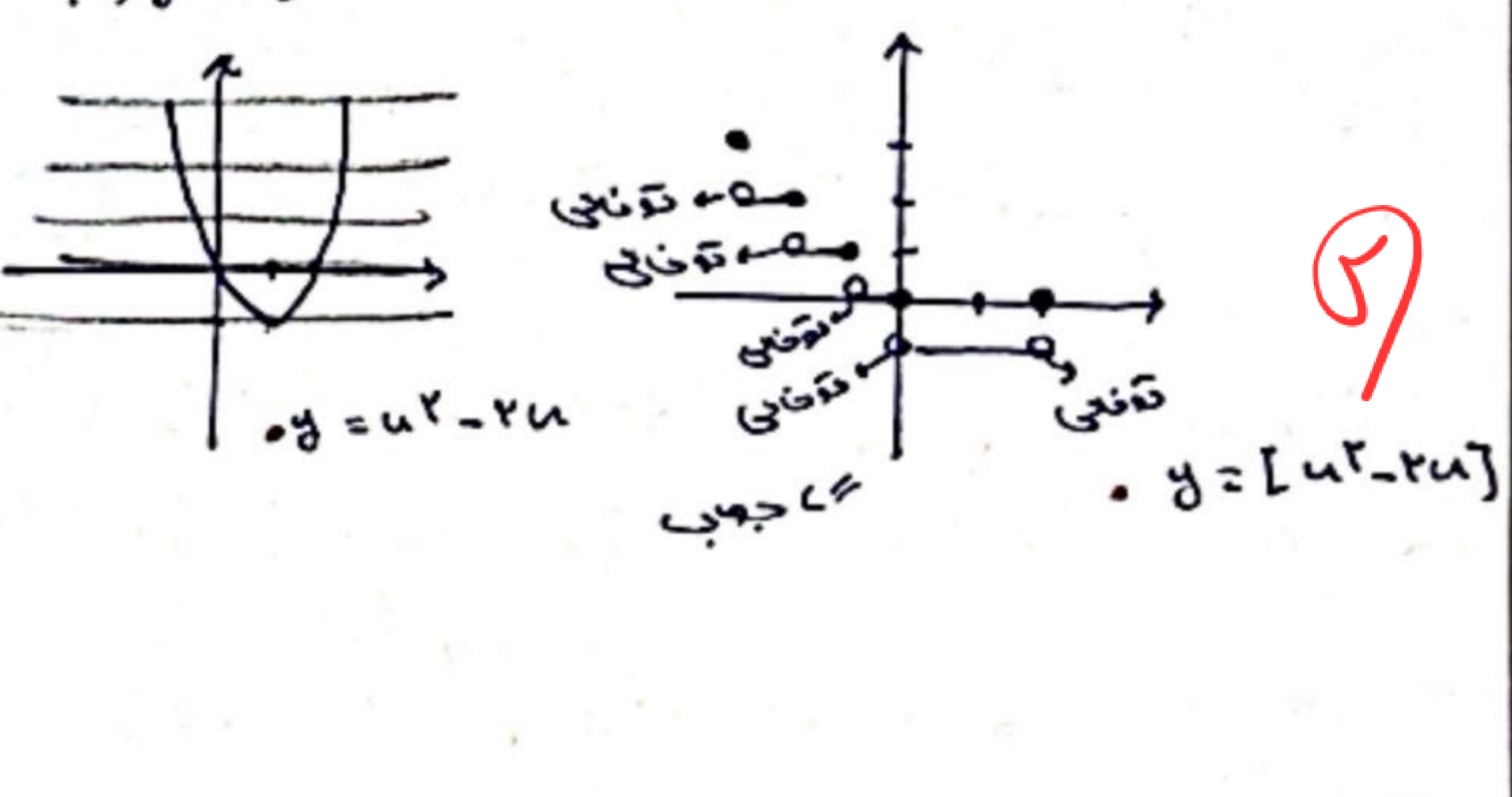
① $\frac{1}{u-1} = |u-1| \Rightarrow u \neq 1 \Rightarrow \frac{1}{u-1} = u-1 \rightarrow u^2 + 1 - 2u = 1 \Rightarrow u(u-2) = 0 \rightarrow u=0 \rightarrow \text{مقدار مثبت دارد} \rightarrow \text{جواب}$
 $\Rightarrow u < 1 \Rightarrow \frac{1}{u-1} = -u+1 \rightarrow 1 = -u^2 + 2u - 1 \xrightarrow{x=1} u^2 - 2u + 2 = 0 \Rightarrow \Delta = 4 - 8 = -4 \rightarrow \text{ریشه ندارد} \rightarrow \Delta < 0$



الف) $|\frac{2u-1}{u}| < 2 \Rightarrow -2 < \frac{2u-1}{u} < 2 \Rightarrow \frac{2u-1}{u} > -2 \rightarrow \frac{2u-1}{u} + 2 > 0 \Rightarrow \frac{2u-1+2u}{u} > 0 \Rightarrow \frac{4u-1}{u} > 0$
 $\Rightarrow \frac{0}{\frac{1}{4}} - \frac{1}{\frac{1}{4}} + \dots \Rightarrow (-\infty, \frac{1}{4}) \cup (\frac{1}{4}, +\infty) \text{ I}$
 $\Rightarrow u > 0 \text{ II}$
 $\text{I} \cap \text{II} \Rightarrow u > \frac{1}{4} \Rightarrow u \in (\frac{1}{4}, +\infty) \Rightarrow \text{جواب}$
 ب) $|\frac{u-2}{2u+1}| > 1 \rightarrow \frac{u-2}{2u+1} > 1 \Rightarrow \frac{u-2-2u-1}{2u+1} > 0 \Rightarrow \frac{-u-3}{2u+1} > 0 \Rightarrow \frac{-\frac{1}{3} - \frac{1}{3}}{\frac{1}{3} + \frac{1}{3}} = -1 \Rightarrow (-\infty, -\frac{1}{3}) \cup (\frac{1}{3}, +\infty) \text{ I}$
 $\& \frac{u-2}{2u+1} < -1 \Rightarrow \frac{u-2}{2u+1} + 1 < 0 \Rightarrow \frac{3u-1}{2u+1} < 0 \Rightarrow \frac{-\frac{1}{3} + \frac{1}{3}}{\frac{1}{3} + \frac{1}{3}} = 0 \Rightarrow (-\infty, -\frac{1}{3}) \cup (\frac{1}{3}, +\infty) \text{ II}$
 $\Rightarrow u \in (-\infty, -\frac{1}{3}) \cup (\frac{1}{3}, +\infty) \Rightarrow \text{جواب}$

$u^2 < |u+4| \Rightarrow u+4 > u^2 \Rightarrow u^2 - u - 4 < 0 \Rightarrow (u-4)(u+2) < 0 \Rightarrow \frac{-2}{\frac{1}{2}} - \frac{4}{\frac{1}{2}} + \dots \rightarrow \text{I} \cap \text{II} \rightarrow (-2, 4)$
 $\Rightarrow u+4 < -u^2 \Rightarrow u+4+u^2 < 0 \Rightarrow \Delta = 1-24 < 0 \Rightarrow \text{ریشه حقیقی ندارد} \Rightarrow \text{II}$
 $|u-\alpha| < \beta \Rightarrow -\beta < u-\alpha < \beta \xrightarrow{+\alpha} \alpha-\beta < u < \alpha+\beta \text{ ②}$
 ① و ② $\alpha-\beta = -2 \Rightarrow 2\alpha = 1 \Rightarrow \alpha = \frac{1}{2} \Rightarrow \text{جواب}$



الف) $f(u) = [1-u] - [u+1]$ $u \in [-1, 1]$ $\rightarrow$ $\frac{-f}{-u+1} \mid \frac{-f}{-u-1} \mid \frac{-f}{u-1-u-1}$ $\Rightarrow -\omega < 1-u - [u+1] \leq \omega \Rightarrow [1-u] - [u+1] = \{-\omega, -\omega-1, \dots, \omega-1, \omega\}$ $\Rightarrow R_f = \{\pm\omega, \pm\omega-1, \pm\omega-2, \dots, \pm\omega-1, 0\} \Rightarrow$ جواب ب) $f(u) = \frac{1}{u} - \left[\frac{u+1}{u} \right] = \frac{1}{u} - \left[\frac{1}{u} \right] - 1 \Rightarrow 0 \leq t < 1 \Rightarrow -1 \leq t-1 < 0$ $\Rightarrow R_f = [-1, 0) \Rightarrow$ جواب		۶
الف) $y = [-2u] - 1 \quad u \in (-1, 1)$ $-1 < u \leq -\frac{1}{2} \Rightarrow y = 1 - 1 = 0$ $-\frac{1}{2} < u \leq 0 \Rightarrow 0 \leq -2u < 1 \Rightarrow [-2u] = 0 \Rightarrow y = -1$ $0 < u \leq \frac{1}{2} \Rightarrow -1 \leq -2u < 0 \Rightarrow [-2u] = -1 \Rightarrow y = -2$ $\frac{1}{2} < u < 1 \Rightarrow -2 < -2u < -1 \Rightarrow [-2u] = -2 \Rightarrow y = -3$ 	ب) $y = u - 2\left[\frac{u}{2}\right] \quad u \in (-2, 2)$ $-2 < u < 0 \Rightarrow -1 < \frac{u}{2} < 0 \Rightarrow \left[\frac{u}{2}\right] = -1 \Rightarrow y = u + 2$ $0 \leq u < 2 \Rightarrow 0 \leq \frac{u}{2} < 1 \Rightarrow \left[\frac{u}{2}\right] = 0 \Rightarrow y = u$ 	۷
الف) $y = [1 u -1] \quad u \in [-2, 2]$ $y = u$ 	ب) $y = [u^2 - 2u] \quad u \in [-1, 2]$ 	۸
$a + [b] = 2, 4 \quad b - [a] = 2, 4$ $[a] = u \Rightarrow a = u + 0, 1, 2$ $[b] = y \Rightarrow b = y + 0, 1, 2$ $\Rightarrow u + 0, 1, 2 + y = 2, 4 \Rightarrow u + y = 2, 4$ $\Rightarrow y + 0, 1, 2 - u = 2, 4 \Rightarrow y - u = 2$ $2y = 4 \Rightarrow y = 2$ $u = 1$	$a + b = 3, 4 + 1, 2 \in \{1, 4\}$ جواب	۹
$(1+\sqrt{2})^4 + (1-\sqrt{2})^4 = 198 \Rightarrow (1+\sqrt{2})^2 = 198 - (1-\sqrt{2})^4 \Rightarrow [(1+\sqrt{2})^2] = [198 - (1-\sqrt{2})^4]$ $\Rightarrow [(1+\sqrt{2})^2] = 194$ ک جواب	۱۹۵	۱۰