

$$\frac{1}{x-1} = |x-1| \begin{cases} x \geq 1 \rightarrow \frac{1}{x-1} = x-1 \Rightarrow x^2 - 2x + 1 = 1 \Rightarrow x^2 - 2x = 0 \Rightarrow x(x-2) = 0 \quad x=0, 2 \quad \checkmark \\ x < 1 \rightarrow \frac{1}{x-1} = -x+1 \Rightarrow -x^2 + 2x - 1 = 1 \Rightarrow x^2 - 2x + 2 = 0 \quad \Delta < 0 \end{cases}$$

ریشه حقیقی ندارد

$\Rightarrow$ معادله ذکر شده تنها دارای
 $\boxed{2} =$ ریشه حقیقی است

(الف) $\left| \frac{2x-1}{x} \right| < 2 \rightarrow -2 < \frac{2x-1}{x} < 2$

$\frac{-1}{x} < 0$

$\frac{0}{+} \frac{0}{-} \frac{-}{+}$

$\boxed{x > 0} \quad I$

$\Rightarrow I \cap II = \boxed{x > \frac{1}{2}}$

$0 < \frac{2x-1}{x}$

$\frac{0}{+} \frac{0}{-} \frac{+}{+}$

$\boxed{x < 0 \cup x > \frac{1}{2}} \quad II$

(ب) $\left| \frac{x-2}{2x+1} \right| > 1 \rightarrow \frac{x-2}{2x+1} > 1 \rightarrow \frac{-x-3}{2x+1} > 0$

$\frac{-3}{-} \frac{-1}{+} \frac{-}{+}$

$\boxed{-3 < x < -\frac{1}{2}} \quad I$

$I \cup II = \boxed{x \in (-3, -\frac{1}{2}) - \{\frac{1}{2}\}}$

$\frac{x-2}{2x+1} < -1 \rightarrow \frac{3x-1}{2x+1} < 0$

$\frac{-1}{-} \frac{1}{+} \frac{+}{+}$

$\boxed{-\frac{1}{3} < x < \frac{1}{2}} \quad II$

$x^2 < |x+6| \rightarrow \begin{cases} x > 6 \rightarrow x^2 - x - 6 < 0 \\ x < 6 \rightarrow x^2 + x + 6 < 0 \end{cases}$

$\frac{-2}{+} \frac{3}{-} \frac{+}{+}$

$\boxed{-3 < x < 3} \quad I$

$|x-a| < b$

$a = ?$

$\Delta < 0 \rightarrow$ $\frac{1}{2}$
 $a > 0 \rightarrow$ $\frac{5}{2}$ } $\rightarrow \emptyset \quad II$

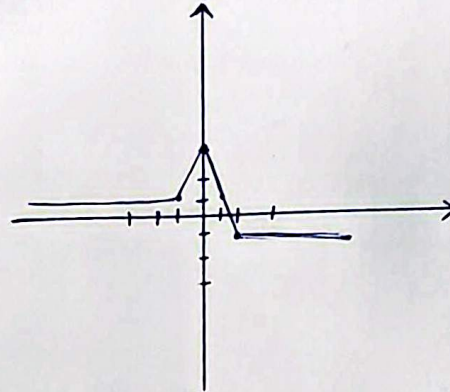
$I \cup II = -3 < x < 3 \quad \frac{3-2}{2} = \frac{1}{2}$

$|x - \frac{1}{2}| < \frac{5}{2}$

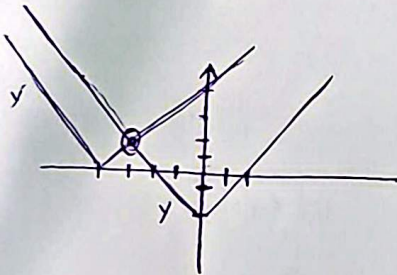
$\frac{1}{2} \downarrow \alpha$ $\frac{5}{2} \downarrow \beta$

$\Rightarrow \boxed{a = \frac{1}{2}}$
 $\boxed{\beta = \frac{5}{2}}$

(F)



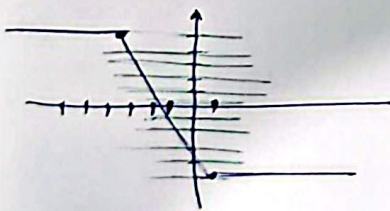
$$\left. \begin{aligned} y &= \left| \frac{1}{\varepsilon} \alpha \right| - r \\ y' &= \left| \frac{1}{\varepsilon} \alpha + r \right| - 1 \end{aligned} \right\} \Rightarrow y = y' \Rightarrow \left| \frac{1}{\varepsilon} \alpha \right| - r = \left| \frac{1}{\varepsilon} \alpha + r \right| - 1$$



$$\Rightarrow \mu < 0, \quad \mu > -\epsilon \quad \Rightarrow -\mu - \epsilon = \mu + \epsilon$$

$$u = -3$$

الف) $f(x) = [\overset{+1}{|1-x|} - \overset{-1}{|x+1|}]$



$$\begin{array}{c}
 \textcircled{+8} \qquad \qquad \qquad \textcircled{1} \\
 | \qquad \qquad \qquad | \\
 1-1111+8 \quad 0 \quad 1-11-1-8 \quad 0 \quad 11-1-11-8 \\
 \textcircled{+} \qquad \qquad \qquad -11-1 \qquad \qquad \qquad \textcircled{-8}
 \end{array}$$

$$R_f = \{-\omega, -\epsilon, -\tau \dots, \tau, \epsilon, \omega\}$$

$$[-\omega, +\omega]$$

$$\therefore f(u) = \frac{1}{u} - \left\lfloor \frac{u+1}{a} \right\rfloor \rightarrow \underbrace{\frac{1}{u} - \left\lfloor \frac{1}{a} \right\rfloor}_{0 \leq y < 1} \ominus 1 \Rightarrow R_f = [-1, 0)$$

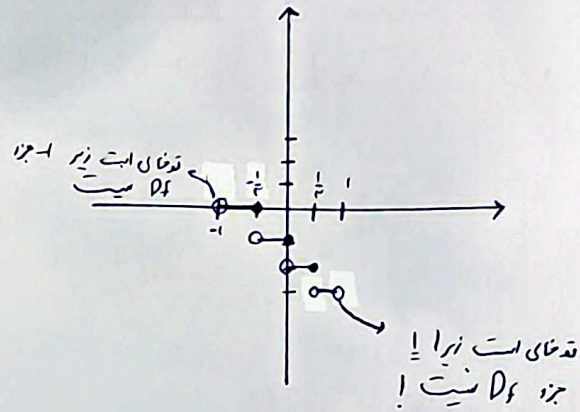
الف) $y = [-2u] - 1$

$u \in (-1, 1)$

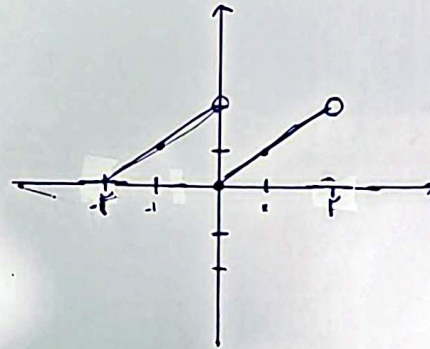
$(-1, 0] \cup [0, 1)$

(۷)

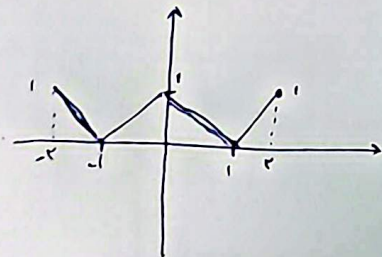
$-1 < -2u \leq 0 \Rightarrow 0 \leq 2u < 1$
 $\boxed{-\frac{1}{2} < u \leq 0} \quad \boxed{0 < u < \frac{1}{2}}$



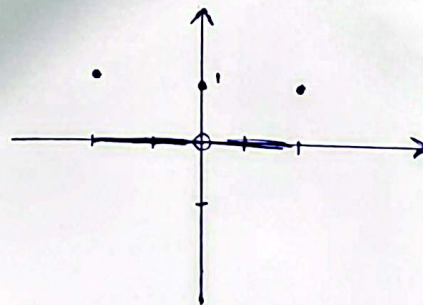
ب) $y = u - 2\left[\frac{u}{2}\right] \quad u \in (-2, 2)$



الف) $y = [||u| - 1|] \quad u \in [-2, 2]$

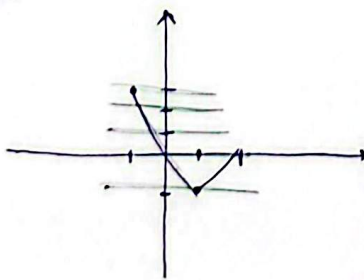


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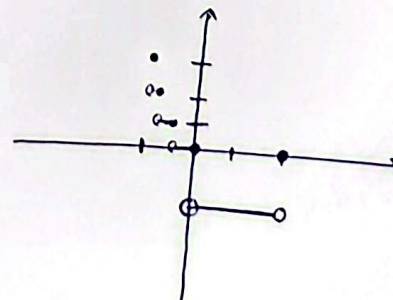


(۸)

ب) $y = [u^2 - 2u] \quad u \in [-1, 2]$



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$$a + [b] = \epsilon/2 \longrightarrow a + kb = \epsilon/2 + Pb \longrightarrow a + b = \epsilon/2$$

$$b - [a] = 2/2 \longrightarrow b - ka = 2/2 - Pa \longrightarrow b - a = 2/2$$

$$Pb = 0/2$$

$$Pa = 0/2$$

$$kb = 2/2$$

$$\begin{cases} b = 3/2 \\ a = 1/2 \end{cases}$$

$$\{ = a + b = 2/2 \checkmark$$

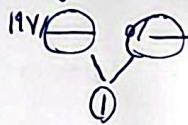
(9)

$$(1 + \sqrt{2})' + (1 - \sqrt{2})' = 191$$

$$\begin{matrix} -0/2 \\ \approx 0 \end{matrix}$$

$$0 < u < 1$$

$$\Rightarrow y + u = 191$$



$$\Rightarrow (1 + \sqrt{2})' = 191 \begin{matrix} [1] \\ 191 \end{matrix}$$

(6)