

$f(u) = \sqrt{1-u^2} \rightarrow (-1, 0) \cup (0, 1) \rightarrow$
 $g(u) = \{(-1, 1) \cup (0, 2) \cup (2, 3)\} \rightarrow$
 $h(u) \rightarrow (-1, 0) \cup (0, 1) \cup (1, 2)$
 $fg - hf \rightarrow D_f \cap D_g \rightarrow \{(-1, 2) \cup (0, 1) \cup (1, 2)\} \rightarrow R = \{2, 0, 1\} \rightarrow 2+0+1=3$

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$f(u) = 2u - 1 \rightarrow D_f = [3, +\infty) \rightarrow R_f = [5, +\infty)$
 $\hookrightarrow 2 \times 3 - 1 = 5 \rightarrow u = 3$
 $g(u) = \frac{1}{3}u + 3 \rightarrow D_g = (-\infty, 3] \rightarrow R_g = (-\infty, 4]$
 $\hookrightarrow \frac{1}{3} \times 3 + 3 = 4 \rightarrow u = 3$
 $R_f \cup R_g = (-\infty, 4] \cup [5, +\infty) \rightarrow$ جواب

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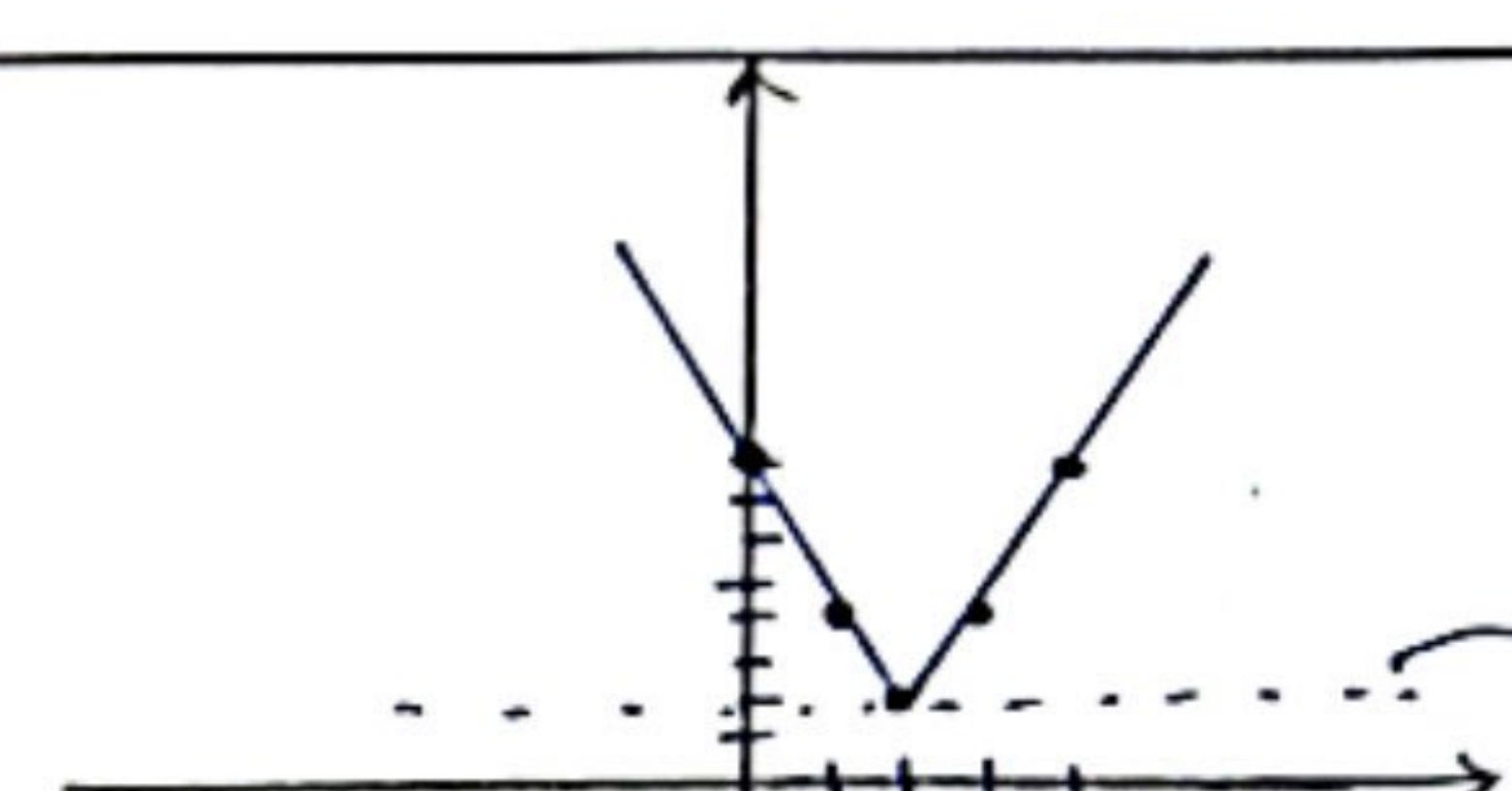
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$y = -\frac{u^2}{2} + u + 3 \rightarrow -\frac{u^2}{2} + u + 3 \geq \frac{3}{2} \rightarrow -u^2 + 2u + 4 \geq 3 \rightarrow -u^2 + 2u + 1 \geq 0 \rightarrow u = -1$
 $\Rightarrow \frac{-1 \pm 3}{-1 \pm 1} \rightarrow (-1, 3)$
 $\sqrt{b-a} = \sqrt{3-(-1)} = \sqrt{4} = 2 \rightarrow$ جواب

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$u = 1 \rightarrow u = 3 \rightarrow u = 2$
 $y = |u-1| + |u-3| + |2u-4|$
 $\begin{array}{c|c|c|c} -2u+4 & -u+2 & u-2 & 2u-4 \end{array}$
 $\begin{array}{c} \textcircled{2} \quad \textcircled{2} \quad \textcircled{2} \end{array}$
 $\rightarrow u = 2 \rightarrow 2 \times 2 - 4 = 0$
 $\rightarrow u = 0 \rightarrow -2 \times 0 + 4 = 4$

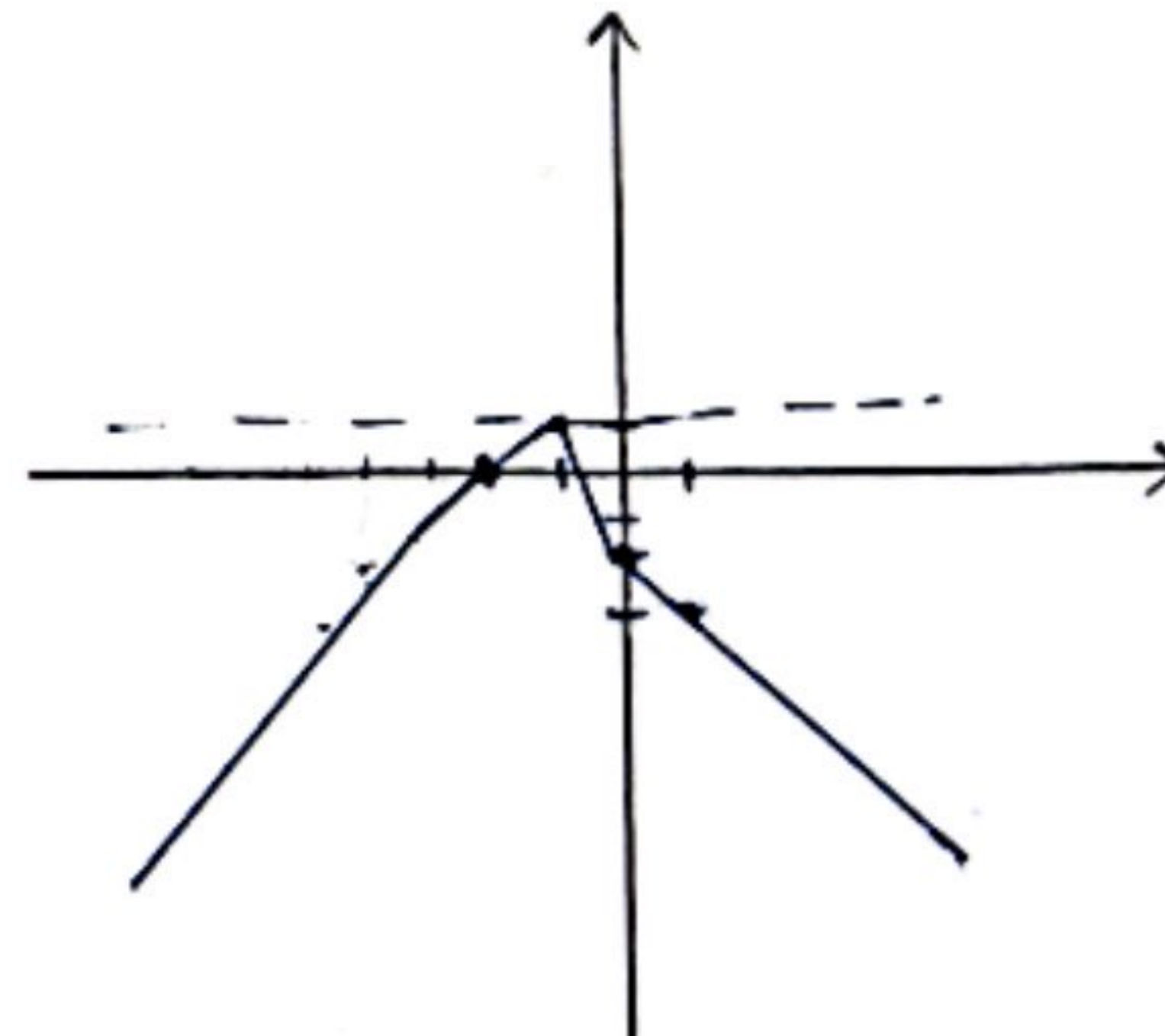


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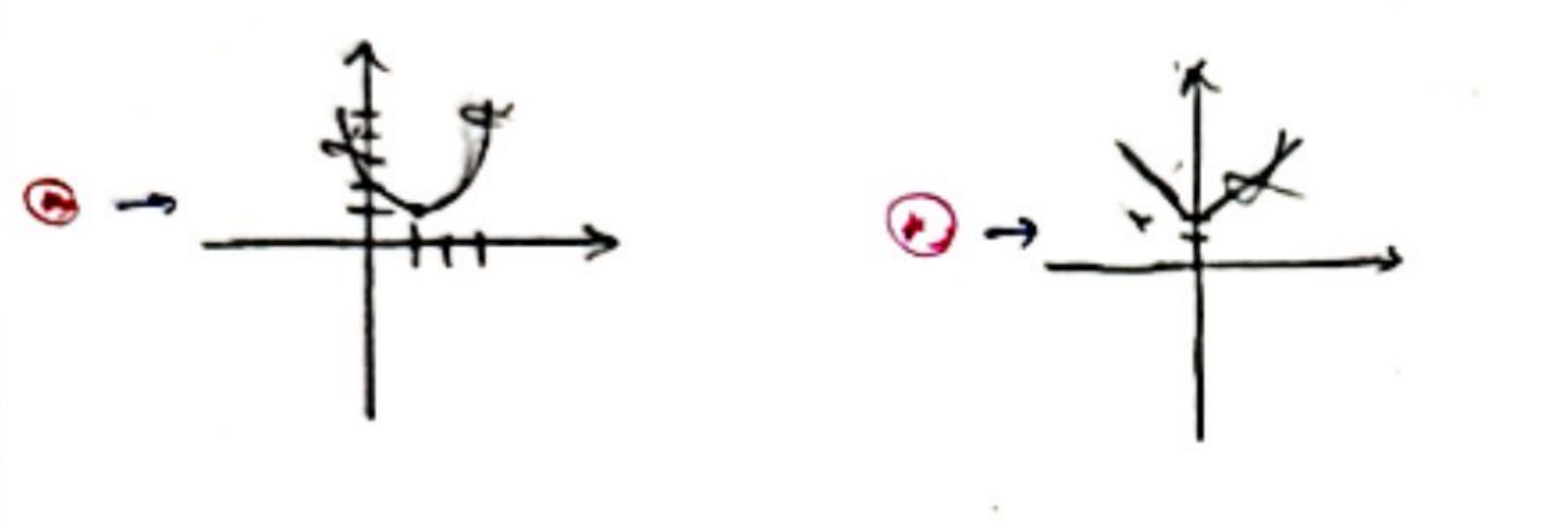
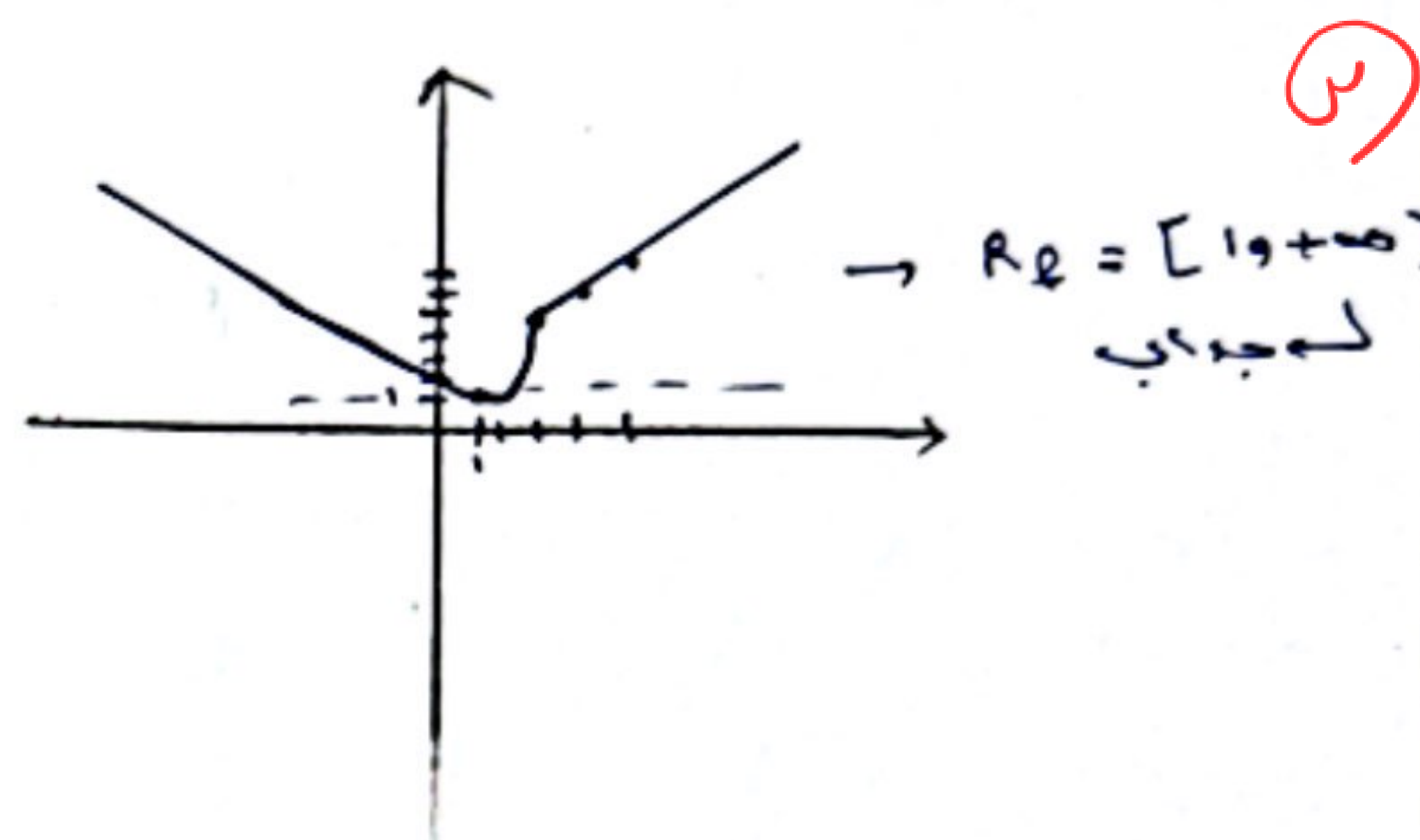
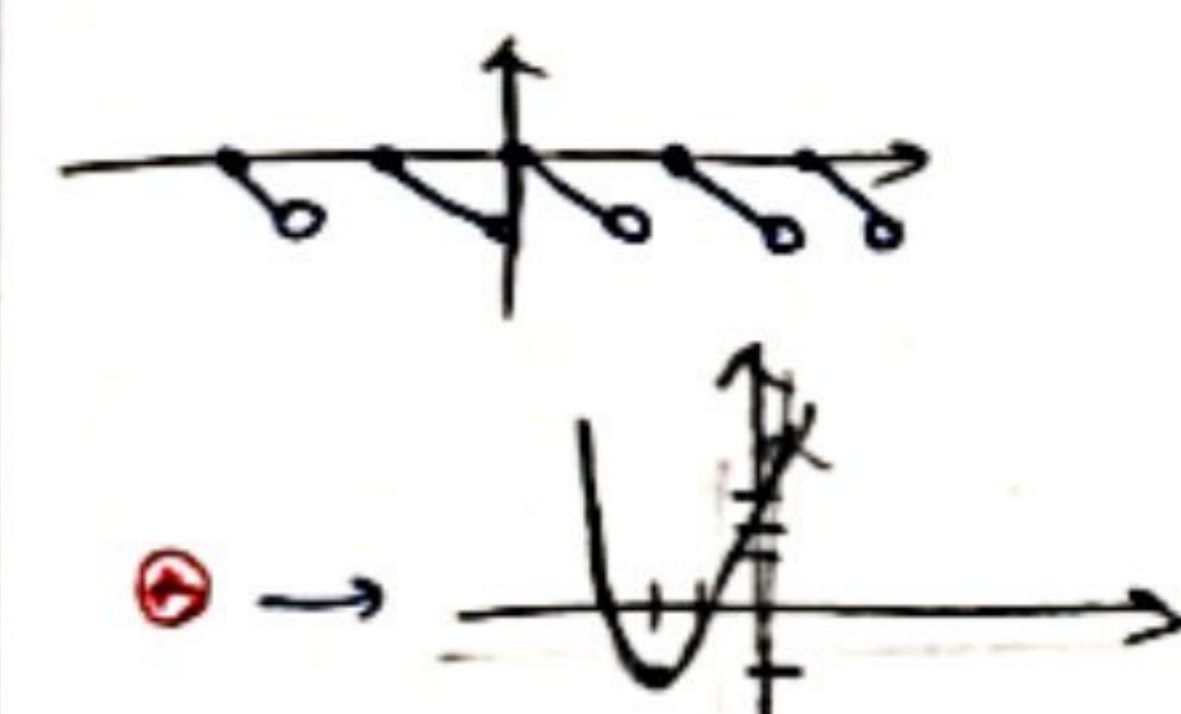
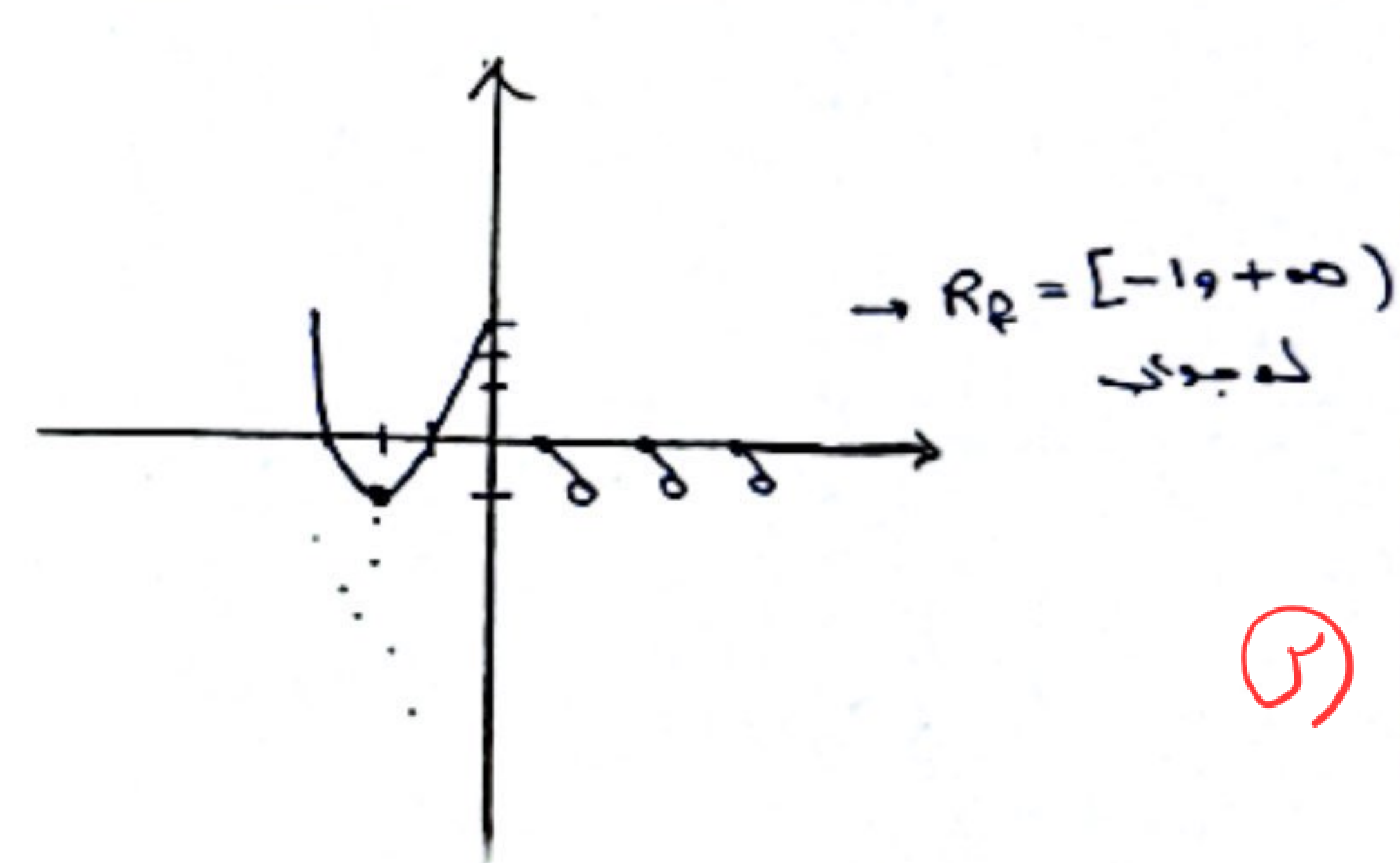
$y = |u| - 2|u+1|$
 $u \geq 0 \rightarrow u = -1$
 $\begin{array}{c|c|c} u+1 & -2u-2 & -u-2 \end{array}$
 $\begin{array}{c} \textcircled{1} \quad \textcircled{-2} \end{array}$
 $\rightarrow u = 1 \rightarrow -(1) - 2 = -3$
 $\rightarrow u = -2 \rightarrow 2 - 2 = 0$



$R_f = (-\infty, 1]$
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$y = \frac{u^2 + \omega u + m}{u+1} \rightarrow y(u+1) = u^2 + \omega u + m \Rightarrow u^2 + \omega u - yu + m - y = 0 \Rightarrow u^2 + u(\omega - y) + (m - y) = 0$ $\Rightarrow u = \frac{-b \pm \sqrt{\Delta}}{2a} \rightarrow \Delta \geq 0 \rightarrow b^2 - 4ac \geq 0 \Rightarrow (\omega - y)^2 - 4(m - y) \geq 0 \rightarrow y^2 + \omega^2 - 4\omega y - 4m + 4y \geq 0$ $\Rightarrow y^2 - 4y + (4\omega - 4m) \geq 0 \xrightarrow{u = -\frac{b}{2a} = \omega} q = 1\omega + (4\omega - 4m) \geq 0 = -4m + 4\omega \geq 0 \rightarrow m \leq \omega \rightarrow u \neq -1$ $(m=2) \rightarrow$ $\frac{u^2 + \omega u + 2}{u+1} \rightarrow \frac{(u+1)(u+1)}{(u+1)} \rightarrow u+1$	6
$f(u) = \begin{cases} u+2 & ; u \geq 2 \Rightarrow u=2 \rightarrow y=2, u=2 \rightarrow y=4, u=2 \rightarrow y=6 \\ u^2 - 2u + 2 & ; 0 \leq u < 2 \rightarrow u = \frac{-b}{2a} = 1, y=1 \\ u + 2 & ; u < 0 \rightarrow \end{cases}$   $\rightarrow R_f = [1, +\infty)$	7
$f(u) = \begin{cases} u^2 + 2u + 2 & ; u \leq 0 \rightarrow u = -\frac{b}{2a} = -1, y = -1 \\ [2u] - 2u & ; u > 0 \rightarrow \end{cases}$ $* y = [u] - u$   $\rightarrow R_f = [-1, +\infty)$	8
$y = a+1 - \sqrt{2u+3}$ $D_f = [b, +\infty) \rightarrow 2u+3 \geq 0 \rightarrow 2u \geq -3 \rightarrow u \geq -\frac{3}{2} \Rightarrow b = -\frac{3}{2} \rightarrow D_f = [-\frac{3}{2}, +\infty)$ $R_f = (-\infty, a]$ $u = -\frac{3}{2}, y = a \rightarrow a = a+1 - \sqrt{2(-\frac{3}{2})+3} \Rightarrow a = a+1 \rightarrow a=2$ $ab = -\frac{3}{2} \times 2 = -3 \rightarrow$	9
$f(u) = 2\sqrt{u+1} + 2\sqrt{u+1}$ $f(u) + g(u) = 2\sqrt{2+2\sqrt{1-u}}$ $\frac{f}{r} - \frac{f}{r} - \frac{g(u)}{r} \rightarrow \frac{f}{r} - (\frac{f}{r} + \frac{g(u)}{r}) \rightarrow \sqrt{u+1} + 2\sqrt{1-u} - (\sqrt{2+2\sqrt{1-u}}) \rightarrow$ $-1 \rightarrow 2\sqrt{2} - \sqrt{2} = \sqrt{2}$ $1 \rightarrow \sqrt{2} - \sqrt{2} = 0 \rightarrow R = [0, \sqrt{2}] \rightarrow$	10