

(الف) $y = \lg(\underbrace{n^2 - n + 1}_{y'}) \rightarrow R_{y'} = \mathbb{R} \rightarrow f_{y'}(y') = y$

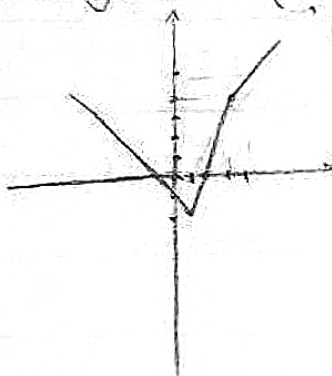
چون y مقدار نسبت $\mathbb{R}$ می تواند داشت پس در دامنه y هر عددی که باشد در $(0, +\infty)$ تعریف می شود و پس $y \in \mathbb{R}$ مقدار $\mathbb{R}$ است.

(ب) $y = \lg\left(\frac{x^2+1}{x}\right) \rightarrow y' = \frac{x^2+1}{x} = x + \frac{1}{x} \rightarrow R_{y'} = (-\infty, -2] \cup [2, +\infty)$

y فقط در این برهه تعریف می شود.

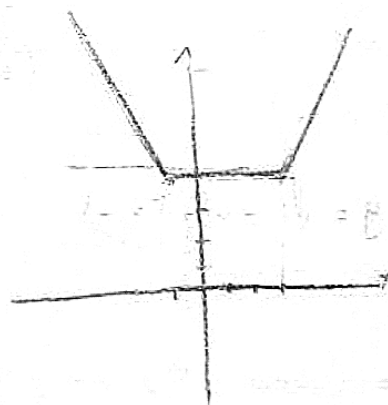
(الف) $y = \lg_r' = 1 \rightarrow R_y = [1, +\infty)$

(الف) $y = |x-2| - |x-3|$



$R_y = [-2, +\infty)$

(ب) $y = |x-2| + |x+1|$



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$R_y = [2, +\infty)$

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 سنگین =

الف) $y = \frac{|x|+1}{|x|-2}$

$\lim_{x \rightarrow -\infty} \frac{|x|+1}{|x|-2} = 1$ $\lim_{x \rightarrow +\infty} \frac{|x|+1}{|x|-2} = 1$
 $\lim_{x \rightarrow -2^-} \frac{|x|+1}{|x|-2} = -\infty$ $\lim_{x \rightarrow -2^+} \frac{|x|+1}{|x|-2} = +\infty$
 $\lim_{x \rightarrow 2^-} \frac{|x|+1}{|x|-2} = +\infty$ $\lim_{x \rightarrow 2^+} \frac{|x|+1}{|x|-2} = -\infty$
 $R_f = (-\infty, -2) \cup (-2, 2) \cup (2, +\infty)$

ب) $y = \frac{x^2+1}{|x|} \rightarrow |x| + \frac{1}{|x|} = y \rightarrow a + \frac{1}{a} = y \rightarrow a > 0 \rightarrow R_f = [2, +\infty)$

$y = \frac{x^2+2x-2}{x+3} = t \rightarrow y(x+3) = x^2+2x-2 \rightarrow x^2 + (3-y)x - 2-3y = 0$

$\Delta \geq 0 \rightarrow (3-y)^2 - 4(-2-3y) \geq 0 \rightarrow y^2 + 12y + 25 \geq 0 \rightarrow (y+5)(y+5) \geq 0$
 $R_f = (-\infty, -5] \cup [-5, +\infty)$

$f(t) = \frac{t^2 - t + 1/4}{t^2 - t + 1} = \frac{(t - 1/2)^2}{(t - 1/2)^2 + 3/4}$ $f(t) = \frac{t^2}{t^2 + 3/4}$

$t \in [0, 1] \rightarrow f(t) \in [0, 1]$

الف) $y = \sqrt{-x^2+2x-1}$ $y' = \frac{-2x+2}{2\sqrt{-x^2+2x-1}}$ $y'_{max} = \frac{-b}{2a} = 1 \rightarrow -x+1=1 \rightarrow x=0 \rightarrow y=1$
 $y'_{min} = -\infty \rightarrow -x+1=-\infty \rightarrow x=+\infty \rightarrow y=-\infty$

$R_{y'} = (-\infty, 1] \rightarrow R_y = [0, 1]$

ب) $y = \sqrt[3]{2x^2-11x}$ $R_{y'} = \frac{min}{max} \frac{4x-11}{3} = 2 \rightarrow 4x-11=6 \rightarrow x=17/4$
 $R_y = [-11, +\infty)$

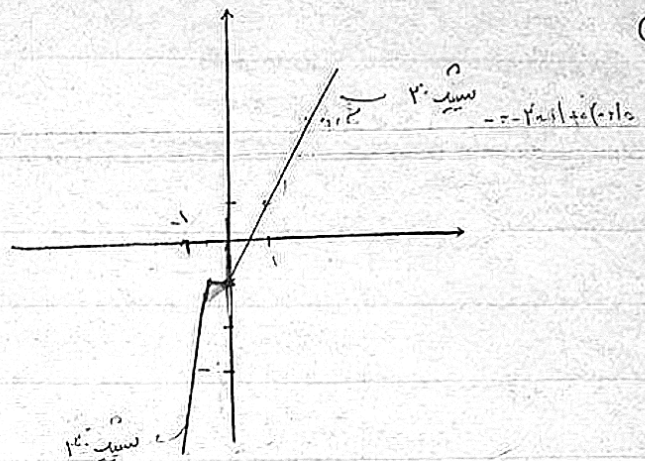
$R_y = \sqrt[3]{R_{y'}} = [-11, +\infty)$

$$y = x - (x+1) + |x|$$

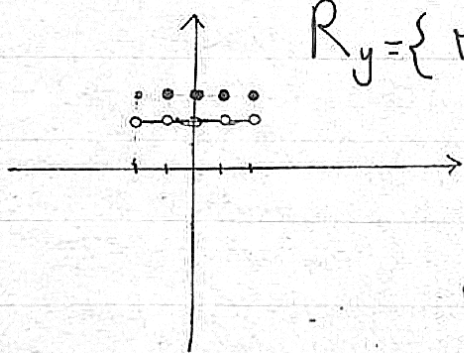
$\downarrow$ $\downarrow$
 $-\frac{1}{x}$ $\frac{1}{x}$

$$\begin{cases} x - x + 1 = 1 \\ -x - 1 + 1 = -x \end{cases}$$

$\rightarrow R_y = \mathbb{R}$



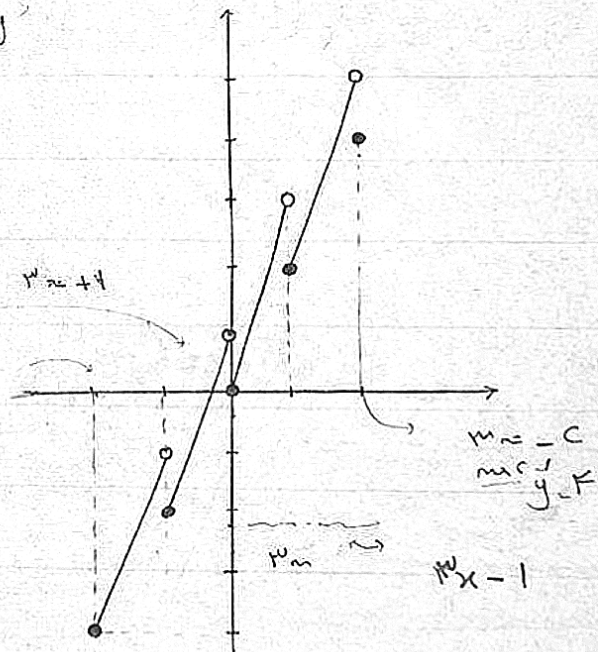
الف) $y = [m] + [x-m] = ([m] + [-m]) + x$



$$R_y = \{x, x\}^y$$

$\Rightarrow y = x - [x]$

$$R = [-1, \infty)$$



$$| -x - 1 - (-x + 1) | \leq 1$$

$$i \cup \emptyset \cup \emptyset$$

$$\Rightarrow (-\infty, -1] \cup$$

$$[-\frac{1}{x}, +\infty)$$

$x \leq 1$
 $x \leq -x$ ✓
 $(-\infty, -1]$
 (ii)

$x - m - x + 1 = 1$
 $-x \leq 1$
 $x \geq -1$ ✓
 (ii)

$x - x - x + 1 = 1$
 $-x \leq \infty$
 $x \geq -\infty$
 $[x, +\infty)$
 (iii)

$$1 + 1 + 1 = 3$$

(10)

الف) $y = \sin^2 x - \sin x + 1$

$$\sin x \begin{cases} \text{max} & 1 - 1 + 1 = 1 = y \\ \text{min} & 1 + 1 + 1 = 3 = y \end{cases}$$

$$R_y = \left[\frac{1}{4}, 3 \right]$$

$$\left(-\frac{b}{2a}, \frac{1}{4} - \frac{1}{4} + 1 = \frac{1}{4} = y \right)$$

ب) $y = \sin^2 x + \sin x + 1$

$$\sin x \begin{cases} \text{max} & 1 + 1 + 1 = 3 \\ \text{min} & 1 \end{cases}$$

$$\rightarrow (R_y = [1, 3] - [-1, 1] + [-1, 1] = [1, 3])$$

$$\left(-\frac{b}{2a} = -\frac{1}{2} \right)$$