

Subject:

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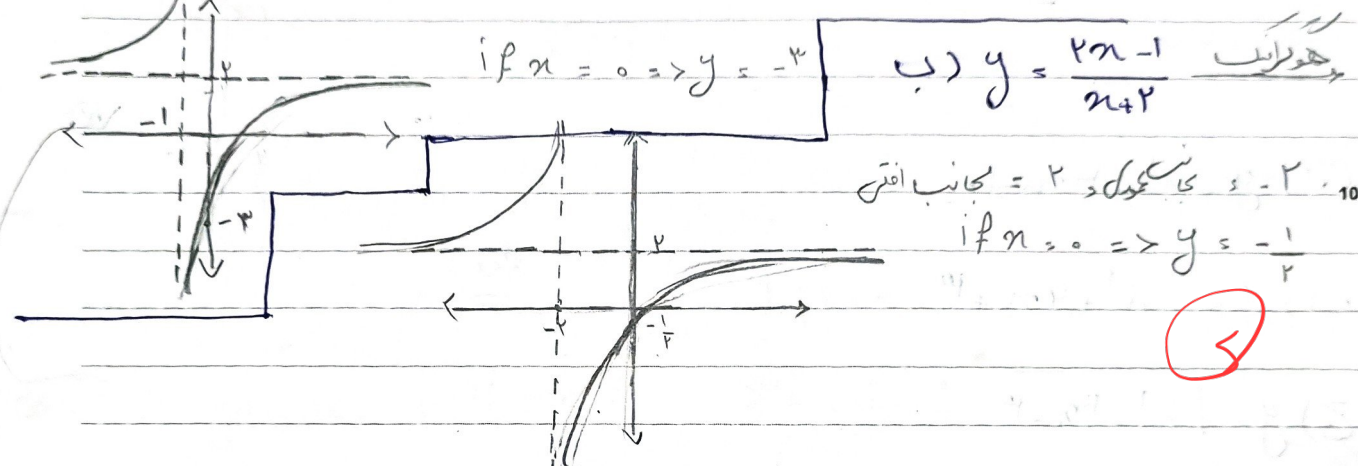
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الف) $y = \frac{2x+1}{x+1}$ $\xrightarrow{\text{جواب}} R_y = \sqrt{R - \{2\}} = [0, +\infty) - \{\sqrt{2}\}$

ب) $y = \sqrt{\frac{3x+1}{-x+2}}$ $\xrightarrow{\text{جواب}} R_y = \sqrt{R - \{2\}} = [0, +\infty)$

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الف) $y = \frac{2x-1}{x+1}$ $\xrightarrow{\text{جواب}} \text{میانگین} = \frac{c}{a} = 2$, $\text{میانگین عمودی} = -\frac{b}{a} = -1$



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الف) $y = \sin x + \frac{1}{\sin x} \Rightarrow -1 \leq \sin x \leq 1 \Rightarrow R_y = (-\infty, -2] \cup [2, +\infty)$

ب) $y = \frac{x^4+1}{x^3} \Rightarrow \frac{x^4}{x^3} + \frac{1}{x^3} \Rightarrow x + \frac{1}{x^3} \Rightarrow R_y = (-\infty, -2] \cup [2, +\infty)$

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ج) $y = \frac{\sqrt[3]{x^2+1}}{\sqrt[3]{x}} \Rightarrow \sqrt[3]{\frac{x^2}{x}} + \frac{1}{\sqrt[3]{x}} \Rightarrow \sqrt[3]{x} + \frac{1}{\sqrt[3]{x}} \Rightarrow R_y = (-\infty, -2] \cup [2, +\infty)$

د) $y = \sqrt{x} + \frac{1}{\sqrt{x}} \Rightarrow x > 0 \Rightarrow R_y = [2, +\infty)$

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الف) $y = x^2 + \frac{1}{x^2+3} + 3 - 3 \Rightarrow x^2 + 3 + \frac{1}{x^2+3} - 3 \xrightarrow{\min_{x=0}} 3 + \frac{1}{3} - 3 = \frac{1}{3}$

$\Rightarrow R_y = [\frac{1}{3}, +\infty)$

ب) $y = \frac{x^2+4+1}{\sqrt{x^2+4}} \Rightarrow \sqrt{x^2+4} + \frac{1}{\sqrt{x^2+4}} \xrightarrow{\min_{x=0}} 2 + \frac{1}{2} = \frac{5}{2}$

$\Rightarrow R_y = [\frac{5}{2}, +\infty)$

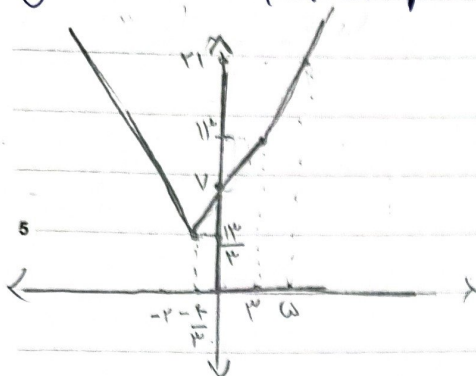
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الف) $y = |x-3| + |x+5| \Rightarrow$

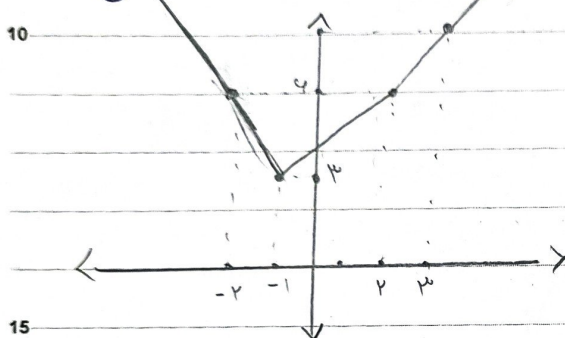


$$\begin{aligned} x &\geq 3 & x-3+x+5 &= 2x+2 \\ -\frac{5}{2} < x < 3 & -x+5+x+5 &= 2x+10 \\ x &\leq -\frac{5}{2} & -x+5-x-5 &= -2x-10 \end{aligned}$$

if $x=3 \rightarrow y=12$, if $x=-\frac{5}{2} \rightarrow y=\frac{13}{2}$

if $x=0 \rightarrow y=8$, if $x=-5 \rightarrow y=10$

ب) $y = |x-2| + |x+2| \Rightarrow$



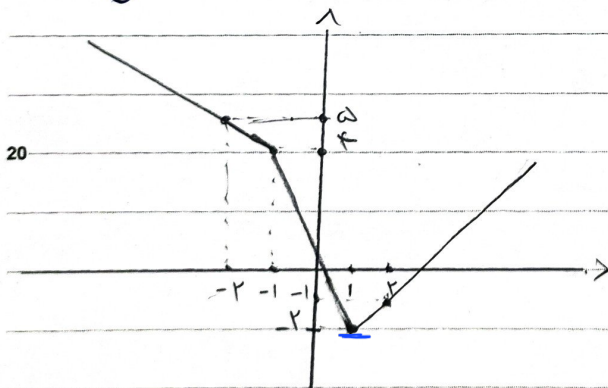
$$\begin{aligned} x &\geq 2 & x-2+x+2 &= 2x \\ -1 &\leq x < 2 & -x+2+x+2 &= x+4 \\ x &\leq -1 & -x+2-x-2 &= -2x-4 \end{aligned}$$

if $x=2 \Rightarrow y=4$, if $x=-1 \Rightarrow y=3$

if $x=3 \rightarrow y=5$, if $x=-2 \rightarrow y=4$

$\Rightarrow R_y = [3, +\infty)$

ج) $y = |x+1| - |x+1| \Rightarrow$



$$\begin{aligned} x &\geq 1 & 2x-2-x-1 &= x-3 \\ -1 &\leq x < 1 & -2x+2-x-1 &= -3x+1 \\ x &\leq -1 & -2x+2+x+1 &= -x+3 \end{aligned}$$

if $x=1 \Rightarrow y=-2$, if $x=-1 \rightarrow y=4$

if $x=2 \rightarrow y=-1$, if $x=-2 \rightarrow y=3$

$R = [-3, +\infty)$

نوشته برد

الف) $y = x^3 - 3x^2 + 3x - 1 + 1 \Rightarrow y = (x-1)^3 + 1 \Rightarrow \sqrt[3]{y-1} = x-1 \Rightarrow$ ①
 $x = \sqrt[3]{y-1} + 1 \Rightarrow R_y = \mathbb{R}$

ب) $y = \frac{1}{x^2 - 2x} \Rightarrow \frac{ax^2 + bx + c}{dx^2 + ex + f} = 0 \Rightarrow x = \frac{-by \pm \sqrt{4y^2 + 4y}}{2y} \Rightarrow$
 $4y^2 + 4y \geq 0 \Rightarrow 4y(y+1) \geq 0 \Rightarrow \frac{-1}{+} \frac{0}{-} \frac{+}{+} \Rightarrow R_y = (-\infty, -1] \cup [0, +\infty)$

الف) $y = x^2 - 4x + 10 \Rightarrow \text{ext} \begin{cases} -\frac{b}{2a} \leq x \\ y = 4 \end{cases} \Rightarrow R_y = [4, +\infty)$

ب) $y = -x^2 + 4x + 3 \Rightarrow \text{ext} \begin{cases} -\frac{b}{2a} \leq x \\ y = -9 + 16 + 3 = 10 \end{cases} \Rightarrow (-\infty, 10]$

ج) $y = \sqrt{x^2 - 4x - 4} \Rightarrow \text{ext} \begin{cases} -\frac{b}{2a} \leq x \\ y = 4 - 16 - 4 = -16 \end{cases} \Rightarrow [-4, +\infty) \Rightarrow R_y = [0, +\infty)$

د) $y = \sqrt{4x - x^2} \Rightarrow \text{ext} \begin{cases} -\frac{b}{2a} \leq x \\ y = 4 \end{cases} \Rightarrow (-\infty, 4] \Rightarrow R_y = [0, 4]$

الف) $y = x^3 - 2x^2 + 2x + 1 \xrightarrow{\text{ط. ذکر}} R_y = \mathbb{R}$ ②

ب) $y = x^3 - 4x^2 + 3x + 2 \xrightarrow{\text{ط. ذکر}} R_y = \mathbb{R}$ ③

ج) $y = \sqrt{x^3 - 4x^2 + 4x + 1} \rightarrow R_y = \sqrt{\mathbb{R}} = [0, +\infty)$

د) $y = (x^3 - 4x^2 + 3x + 1)^2 \rightarrow R_y = (\mathbb{R}^2) = [0, +\infty)$

الف) $y = \frac{x^3 + 1}{x^2 - 2} \xrightarrow{\text{حد رانیب}} R_y = \mathbb{R} - \{2\}$ ④

ب) $y = \frac{2x + 1}{x + 1} \xrightarrow{\text{حد رانیب}} R_y = \mathbb{R} - \{2\}$ ⑤