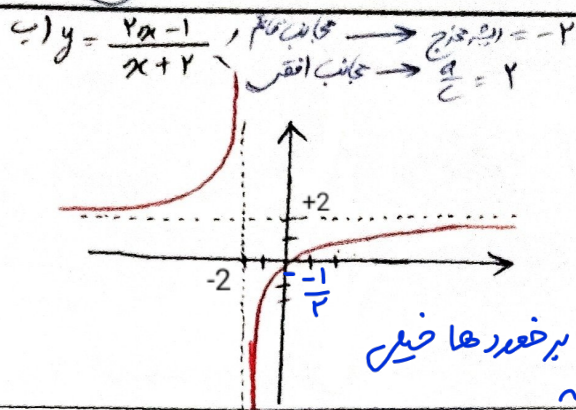
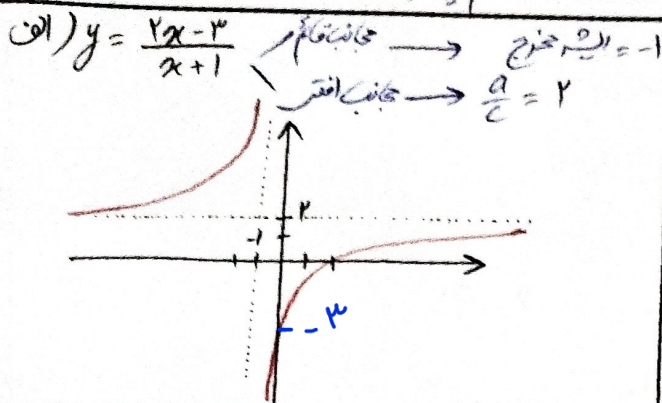


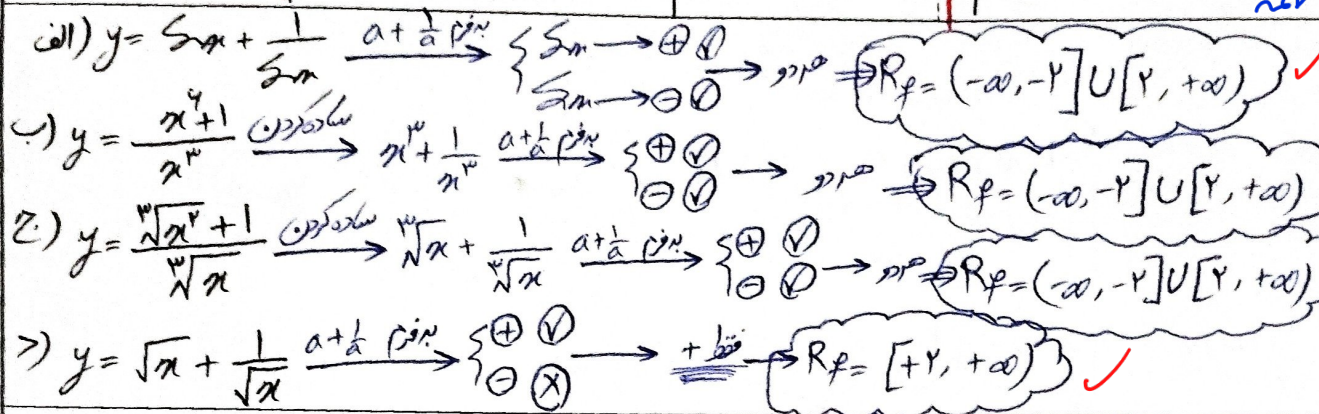
الف) $y = x^3 - 3x^2 + 3x \xrightarrow{\text{فاکتورگیری}} x(x^2 - 3x + 3) = y \xrightarrow{x \neq 0} x = \frac{y}{x^2 - 3x + 3} = \frac{y}{\frac{4 \pm \sqrt{9-12}}{2}}$ ب) $y = \frac{1}{x^2 - 2x} \xrightarrow{\text{تقسیم و ضرب}} 1 = yx^2 - 2yx \rightarrow yx^2 - 2yx - 1 = 0 \rightarrow \begin{cases} x = \frac{-b \pm \sqrt{\Delta}}{2a} \\ x = \frac{2y \pm \sqrt{4y^2 + 4y}}{2y} \end{cases}$ $\Rightarrow \begin{cases} 2y \neq 0 \rightarrow y \neq 0 \\ 4y^2 + 4y \geq 0 \rightarrow y(y+1) \geq 0 \end{cases} \rightarrow R_f = (-\infty, -1] \cup (0, +\infty)$				۱
الف) $y = x^2 - 4x + 10$ ext / $-\frac{b}{2a} = 2$ ext / $-\frac{\Delta}{4a} = 9$ $R_f = [9, +\infty)$	ب) $-x^2 + 4x + 3$ ext / $-\frac{b}{2a} = -\frac{4}{-2} = 2$ ext / $-\frac{\Delta}{4a} = 12$ $R_f = (-\infty, +12]$	ج) $y = \sqrt{x^2 - 4x - 3}$ ext / $-\frac{b}{2a} = 2$ ext / $-\frac{\Delta}{4a} = -1$ $y = \sqrt{[-1, +\infty)}$ $R_f = [0, +\infty)$	د) $y = \sqrt{4x - x^2}$ ext / $-\frac{b}{2a} = 2$ ext / $-\frac{\Delta}{4a} = 4$ $y = \sqrt{(-\infty, +4]}$ $R_f = [0, 2]$	۲
الف) $y = x^3 - 5x^2 + 2x + 1 \rightarrow R_y = \mathbb{R}$	ب) $y = x^3 - 4x^2 + 3x + 2 \rightarrow R_y = \mathbb{R}$	ج) $y = \sqrt{x^3 - 4x^2 + 5x + 1} \rightarrow y = \sqrt{\mathbb{R}} \rightarrow R_y = [0, +\infty)$	د) $y = (x^3 - 4x^2 + 3x + 1)^2 \rightarrow y = \mathbb{R}^+ \rightarrow R_y = [0, +\infty)$	۳
الف) $y = \frac{2x+1}{x-2} \xrightarrow{\text{تقسیم و ضرب}} \begin{cases} C \neq 0 \\ ad \neq bc \end{cases} \Rightarrow R_f = \mathbb{R} - \left\{ \frac{a}{c} \right\} \rightarrow \mathbb{R} - \{2\}$	ب) $y = \frac{2x+1}{x+1} \xrightarrow{\text{تقسیم و ضرب}} \begin{cases} C \neq 0 \\ ad \neq bc \end{cases} \Rightarrow R_f = \mathbb{R} - \left\{ \frac{a}{c} \right\} \rightarrow \mathbb{R} - \{2\}$			۴
الف) $y = \sqrt{\frac{2x+1}{x+1}} \xrightarrow{\text{تقسیم و ضرب}} \begin{cases} C \neq 0 \\ ad \neq bc \end{cases} \Rightarrow R_f = \sqrt{\mathbb{R} - \left\{ \frac{a}{c} \right\}} \Rightarrow R_f = \sqrt{\mathbb{R} - \{2\}} = [0, +\infty) - \{\sqrt{2}\}$	ب) $y = \sqrt{\frac{2x+1}{2-x}} \xrightarrow{\text{تقسیم و ضرب}} \begin{cases} C \neq 0 \\ ad \neq bc \end{cases} \Rightarrow R_f = \sqrt{\mathbb{R} - \left\{ \frac{a}{c} \right\}} \rightarrow R_f = \sqrt{\mathbb{R} - \{-2\}} \Rightarrow R_f = [0, +\infty)$			۵

از طرف A به B

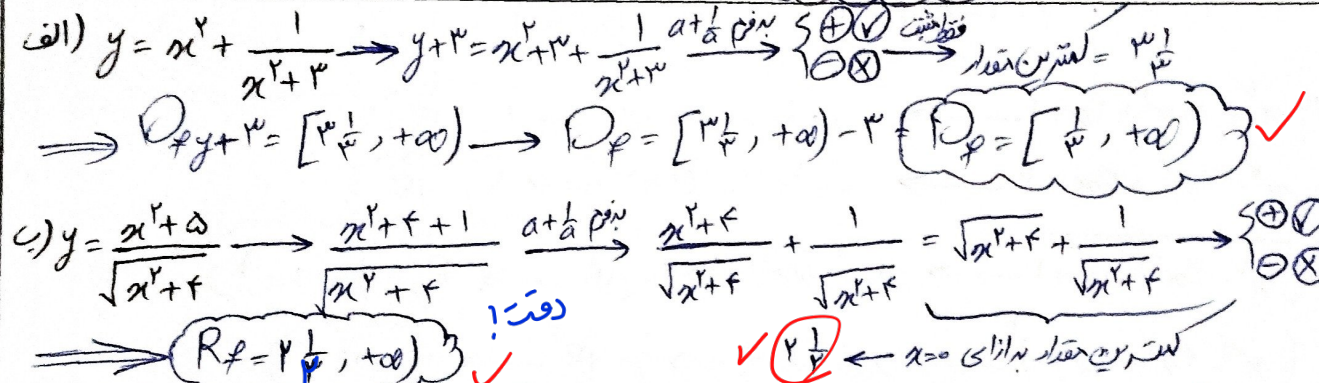
از طرف B به A



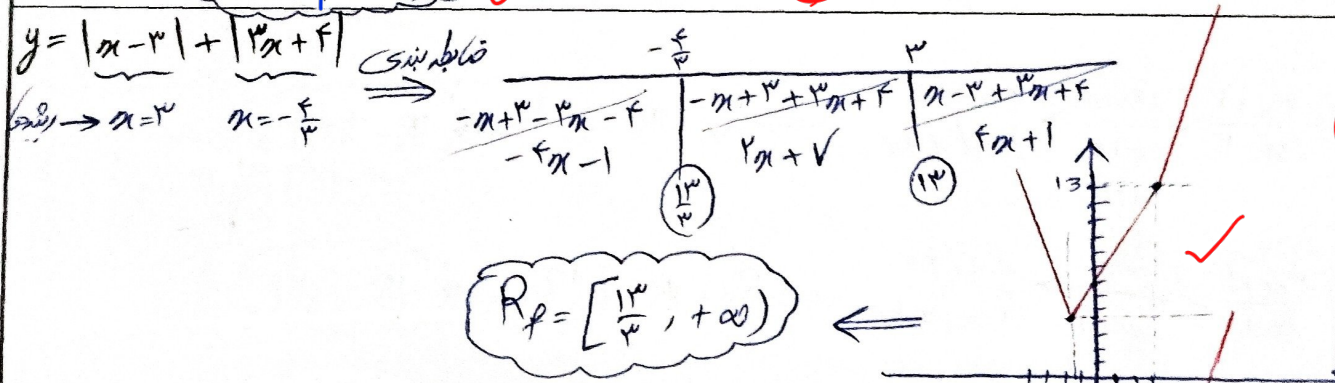
(2) 6



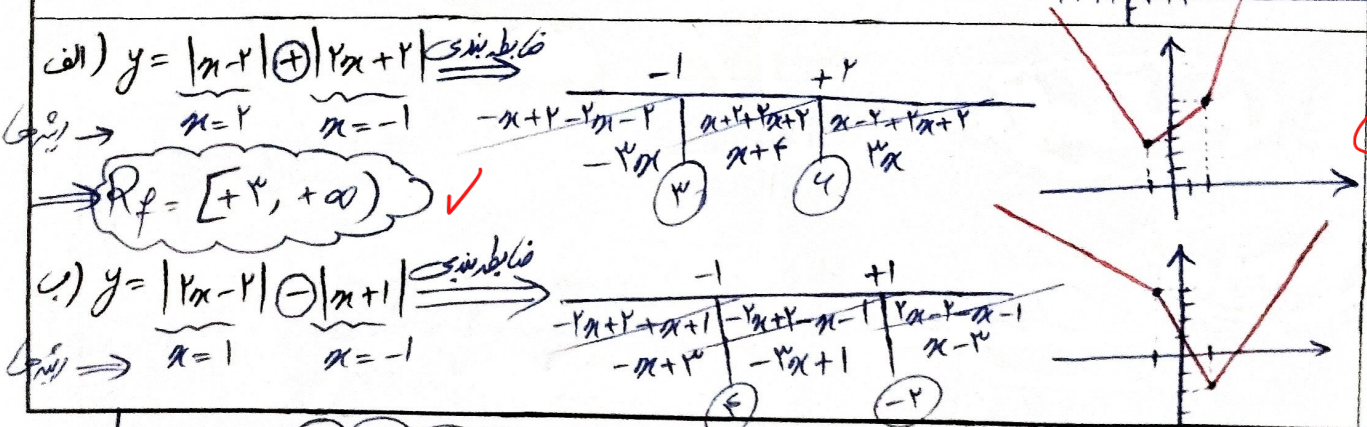
(2) 7



(2) 8



(2) 9



(2) 10

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