

۱) $y = x^2 - 8 \rightarrow y + 8 = x^2 \rightarrow \sqrt{y+8} = x \rightarrow y+8 \geq 0 \rightarrow y \geq -8 \rightarrow R_f = [-8, +\infty)$

ب) $y = x^3 + 1 \rightarrow y - 1 = x^3 \rightarrow x = \sqrt[3]{y-1} \rightarrow R_f = \mathbb{R}$

۲) الف) $y = (x^2 - 2x + 2) \rightarrow y = (x-1)^2 + 1 \rightarrow y-1 = (x-1)^2 \rightarrow \sqrt{y-1} = x-1 \rightarrow y-1 \geq 0 \rightarrow y \geq 1 \rightarrow R_f = [1, +\infty)$

ب) $y = x^2 - 2x + 1 \rightarrow x^2 - 2x + 1 - y = 0 \rightarrow \Delta = b^2 - 4ac \rightarrow 4 - 4(1-y) \geq 0 \rightarrow 4 - 4 + 4y \geq 0 \rightarrow 4y \geq 0 \rightarrow y \geq 0 \rightarrow R_f = [0, +\infty)$

۳) الف) $y = \frac{x^2 + 3}{x^2 - 2} \rightarrow y(x^2 - 2) = x^2 + 3 \rightarrow yx^2 - 2y = x^2 + 3 \rightarrow yx^2 - x^2 = 3 + 2y \rightarrow x^2(y-1) = 3+2y \rightarrow x^2 = \frac{3+2y}{y-1} \rightarrow \frac{3+2y}{y-1} \geq 0$

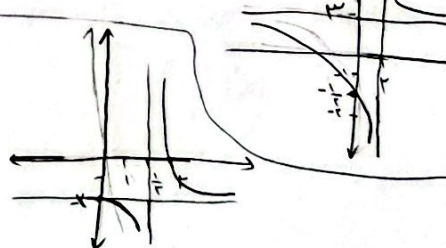
ب) $y = \frac{2|x|+1}{|x|-2} \rightarrow y(|x|-2) = 2|x|+1 \rightarrow y|x| - 2y = 2|x|+1 \rightarrow y|x| - 2|x| = 2y+1 \rightarrow |x|(y-2) = 2y+1 \rightarrow |x| = \frac{2y+1}{y-2} \rightarrow \frac{2y+1}{y-2} \geq 0 \rightarrow R_f = (-\infty, -\frac{1}{2}] \cup (2, +\infty)$

۴) $y = \frac{1}{x^2 - 2x} \rightarrow y(x^2 - 2x) = 1 \rightarrow ax^2 + bx + c = 0 \rightarrow a = y, b = -2y, c = 1 \rightarrow \Delta = b^2 - 4ac \rightarrow 4y^2 - 4y \geq 0 \rightarrow 4y(y-1) \geq 0 \rightarrow y \leq 0 \text{ or } y \geq 1 \rightarrow R_f = (-\infty, 0] \cup [1, +\infty)$

۵) الف) $y = x^2 - 4x + 2 \rightarrow a = 1 \rightarrow a > 0 \rightarrow \min \left| \begin{array}{l} x_{\min} \rightarrow -\frac{b}{2a} \rightarrow 2 \\ y_{\min} \rightarrow -\frac{\Delta}{4a} \rightarrow -5 \end{array} \right. \rightarrow R_f = [-5, +\infty)$

ب) $y = -x^2 + 2x + 2 \rightarrow a = -1 \rightarrow a < 0 \rightarrow \max \left| \begin{array}{l} x_{\max} \rightarrow -\frac{b}{2a} \rightarrow 1 \\ y_{\max} \rightarrow \frac{\Delta}{4a} \rightarrow 4 \end{array} \right. \rightarrow R_f = (-\infty, 4]$

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الف) $y = \sqrt{x^2 - 4x + 2} \rightarrow a > 0 \rightarrow \min \left \begin{array}{l} -\frac{b}{2a} \rightarrow 2 \\ 4 - 1 \times 4 + 2 \rightarrow -2 \end{array} \right. \rightarrow [-2, +\infty) \xrightarrow{\text{میزان اعداد}} [0, +\infty)$ ب) $y = \sqrt{-x^2 + 4x + 10} \rightarrow a < 0 \rightarrow \max \left \begin{array}{l} -\frac{b}{2a} \rightarrow \frac{2}{-1} = -2 = x_{\max} \\ y_{\max} \rightarrow -(-2)^2 + 4(-2) + 10 = 14 \end{array} \right. \rightarrow (-\infty, +14] \xrightarrow{\text{میزان اعداد}} [0, +14]$	۶
الف) $y = x^4 + x^2 + 4x + 1 \rightarrow \mathbb{R} \rightarrow \mathbb{R}$ ب) $y = \sqrt{x^4 + 4x^2 + 4x + 1} \rightarrow \sqrt{1} \rightarrow [0, +\infty) \leftarrow \mathbb{R}$	۷
الف) $y = \frac{a}{b} \frac{x+c}{x+d} \rightarrow \mathbb{R} - \{\frac{a}{c}\} \rightarrow \mathbb{R} - \{\frac{a}{c}\} = \mathbb{R}$ ب) $y = \sqrt{\frac{5x+1}{x+3}} \rightarrow \mathbb{R} = \mathbb{R} - \{-\frac{1}{5}\} \xrightarrow{\text{میزان اعداد}} \mathbb{R} = [0, +\infty) - \{-\frac{1}{5}\}$	۸
الف) $y = \frac{3x+1}{x-2} \rightarrow \begin{array}{l} \text{مخرج} \rightarrow x-2=0 \rightarrow x=2 \\ \text{صورت} \rightarrow y=\frac{a}{c} \Rightarrow \frac{3}{-1} = -3 \end{array} \left. \begin{array}{l} n=0 \rightarrow y = -\frac{1}{2} \\ \text{نقطه} \end{array} \right\}$ ب) $y = \frac{5x-2}{1-2x} \rightarrow \begin{array}{l} \text{مخرج} \rightarrow 1-2x=0 \rightarrow x=\frac{1}{2} \\ \text{صورت} \rightarrow y=\frac{a}{c} \Rightarrow \frac{5}{-2} = -\frac{5}{2} \end{array}$ $x=0 \rightarrow \frac{2}{1} = 2 \rightarrow (-2) = y$ $y=0 \rightarrow x=2$ 	۹
الف) $y = \cos^2 x + \frac{1}{\cos^2 x} \rightarrow \mathbb{R} = [2, +\infty)$ ب) $y = \sqrt{\frac{x^2+1}{x}} \rightarrow x \left(n + \frac{1}{n} \right) \rightarrow \begin{array}{l} -\infty \\ +\infty \end{array} \rightarrow \mathbb{R} = (-\infty, -2] \cup [2, +\infty)$	۱۰