

الف) $x^2 = y + 5 \quad x = \pm \sqrt{y + 5} \quad R_f = [-5, +\infty)$

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

الف) $y = x^2 - 4x + 4 \Rightarrow y = (x - 2)^2 + 2 \Rightarrow (x - 2)^2 = y - 2 \Rightarrow x = \sqrt{y - 2} + 2$
 $R_f = [2, +\infty)$

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

الف) $y = \frac{x^2 + 3}{x^2 - 2} \Rightarrow x^2 + 3 = yx^2 - 2y \Rightarrow x^2 - yx^2 = -3 - 2y \Rightarrow x^2(1 - y) = -3 - 2y$
 $= -3 - 2y \Rightarrow x^2 = \frac{-3 - 2y}{1 - y} \Rightarrow x = \pm \sqrt{\frac{-3 - 2y}{1 - y}} \quad R_f = [-\frac{3}{2}, 1)$

ب) $\frac{2x + 1}{|x - 2|} = y \Rightarrow |2x - y| = -1 - 4y \Rightarrow |x(2 - y)| = -1 - 4y \Rightarrow |x| = \frac{-1 - 4y}{2 - y}$
 $= \frac{-1 - 4y}{2 - y} \quad R_f = (-\infty, -\frac{1}{4}] \cup [2, +\infty)$

$y = \frac{1}{x^2 - 4x} \Rightarrow 1 = yx^2 - 4x \Rightarrow x^2y - 4x - 1 = 0$
 $\Rightarrow x = \frac{-b \pm \sqrt{\Delta}}{2a} \Rightarrow x = \frac{4 \pm \sqrt{16 + 4y}}{2y} \Rightarrow \Delta \geq 0 \Rightarrow 16 + 4y \geq 0$
 $\Rightarrow y \geq -4 \Rightarrow R_f = [-4, +\infty)$

الف) $y = x^2 - 4x + 2 \quad \min \left| \begin{matrix} 2 \\ -2 \end{matrix} \right| \quad R_f = [-2, +\infty)$

ب) $y = -x^2 + 4x + 2 \quad \max \left| \begin{matrix} 2 \\ 4 \end{matrix} \right| \quad R_f = (-\infty, 6]$

$$\text{الف) } y = \sqrt{x^2 - 4x + 2} \quad \min \left| \frac{y}{-x} = r \right| \quad R_f = [0, +\infty)$$

$$\text{ب) } y = \sqrt{-x^2 + 6x + 10} \quad \max \left| \frac{-f}{-x} = r \right| \quad R_f = [0, \sqrt{14}]$$

$$\text{الف) } y = x^3 + 3x^2 + 2x + 1 \Rightarrow R_f = \mathbb{R}$$

$$\text{ب) } y = \sqrt{x^2 + 6x + 10} \Rightarrow R_f = [0, +\infty)$$

$$\text{الف) } y = \frac{2x+1}{x-2} \Rightarrow R_f = \mathbb{R} - \{2\}$$

$$\text{ب) } y = \sqrt{\frac{2x+1}{x+2}} \Rightarrow R_f = \sqrt{\mathbb{R} - \{-2\}} \Rightarrow R_f = [0, +\infty) - \{2\}$$

$$\text{الف) } y = \cos^2 x + \frac{1}{\cos^2 x} \Rightarrow R_f = [-\infty, -2] \cup [2, +\infty)$$

$$\text{ب) } y = \sqrt{\frac{x^2+1}{x}} \Rightarrow y = \sqrt{x + \frac{1}{x}} \Rightarrow R_f = (-\infty, -2] \cup [2, +\infty)$$