

الف) $y = x^2 - \omega \Rightarrow x^2 = y + \omega \Rightarrow x = \pm \sqrt{y + \omega} \Rightarrow y + \omega \geq 0 \Rightarrow y \geq -\omega \Rightarrow R_f = [-\omega, +\infty)$

ب) $y = x^2 + 1 \Rightarrow x^2 = y - 1 \Rightarrow x = \pm \sqrt{y - 1} \Rightarrow y - 1 \geq 0 \Rightarrow y \geq 1 \Rightarrow R_f = [1, +\infty)$

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

ب) $y = x^2 - \omega x + 1 \Rightarrow y - x^2 + \omega x - 1 = 0 \Rightarrow \Delta \geq 0 \Rightarrow \omega^2 - 4(y - 1) \geq 0 \Rightarrow y \leq \frac{\omega^2}{4} + 1 \Rightarrow R_f = (-\infty, \frac{\omega^2}{4} + 1]$

الف) $y = \frac{x^2 - 3}{x^2 - 2} \Rightarrow y(x^2 - 2) = x^2 - 3 \Rightarrow x^2(y - 1) = -y + 3 \Rightarrow x = \pm \sqrt{\frac{-y + 3}{y - 1}} \Rightarrow \frac{-y + 3}{y - 1} \geq 0 \Rightarrow R_f = (-\infty, \frac{3}{2}] \cup (1, +\infty)$

ب) $y = \frac{2|x| + 1}{|x| - 4} \Rightarrow y(|x| - 4) = 2|x| + 1 \Rightarrow |x| = \frac{2y + 1}{y - 2} \Rightarrow \frac{2y + 1}{y - 2} \geq 0 \Rightarrow R_f = (-\infty, -\frac{1}{2}] \cup (2, +\infty)$

$y = \frac{1}{x^2 - 4} \Rightarrow y(x^2 - 4) = 1 \Rightarrow x^2 = \frac{y + 4}{y} \Rightarrow x = \pm \sqrt{\frac{y + 4}{y}} \Rightarrow \frac{y + 4}{y} \geq 0 \Rightarrow R_f = (-\infty, -4] \cup (0, +\infty)$

الف) $y = x^2 - 4x + 2 \Rightarrow \frac{-b}{2a} = \frac{4}{2} = 2 \Rightarrow R_f = [2, +\infty)$

ب) $y = -x^2 + 4x + 2 \Rightarrow \frac{-b}{2a} = \frac{-4}{-2} = 2 \Rightarrow R_f = (-\infty, 2]$

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

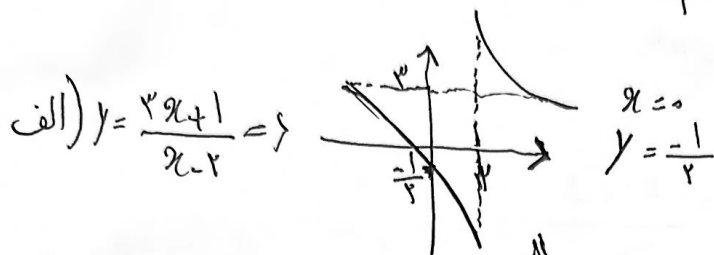
ب) $y = \sqrt{-x^2 + 4x + 2} \Rightarrow \frac{-4}{-2} = 2 \Rightarrow R_f = \sqrt{(-\infty, 2]} = [0, \sqrt{10}]$

الف) $y = x^{\frac{1}{3}} + 2x + 1 \Rightarrow R_f = \mathbb{R}$ ب) $y = \sqrt{x^2 + 2x + 1} \Rightarrow R_f = [0, +\infty)$

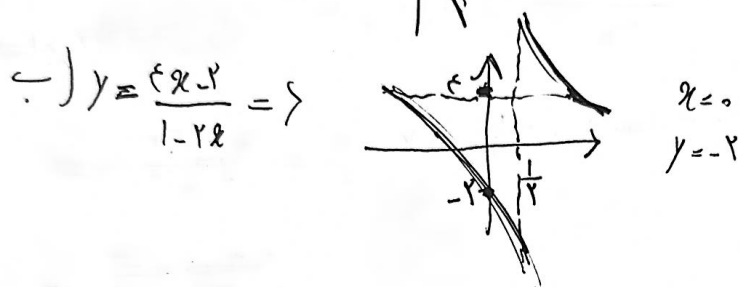
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الف) $y = \frac{x+1}{x-2} \Rightarrow R = \left\{ \frac{c}{a} \right\} \Rightarrow R = \{2\}$ ب) $y = \sqrt{\frac{x+1}{x+3}} \Rightarrow R_f = \sqrt{R - \{2\}} = [0, +\infty) - \{2\}$

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

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