

(الف) $y = x^2 - 4$ $x^2 = y + 4 \rightarrow x = \pm \sqrt{y+4}$ $R_f = [4, +\infty)$	(ب) $y = x^2 + 1$ $x^2 = y - 1 \rightarrow x = \pm \sqrt{y-1}$ $R_f = \mathbb{R}$	۱
(الف) $y = x^2 - 4x + 7$ $y = x^2 - 4x + 4 + 3$ $y = (x-2)^2 + 3$ $(x-2)^2 = y - 3$ $x = \pm \sqrt{y-3} + 2$ $R_f = [3, +\infty)$	(ب) $y = x^2 - 4x + 1$ $y = x^2 - 4x + \frac{16}{4} - \frac{16}{4} + 1 = (x - \frac{4}{2})^2 - \frac{15}{4}$ $(x - \frac{4}{2})^2 = y + \frac{15}{4} \rightarrow x - \frac{4}{2} = \pm \sqrt{y + \frac{15}{4}}$ $\rightarrow x = \frac{4}{2} \pm \sqrt{y + \frac{15}{4}}$ $R_f = [-\frac{15}{4}, +\infty)$	۲
(الف) $y = \frac{x^2 + 3}{x^2 - 2}$ $R_f = (-\infty, -\frac{3}{2}] \cup (1, +\infty)$ $y(x^2 - 2) = x^2 + 3$ $y x^2 - x^2 = 2y + 3$ $x^2(y - 1) = 2y + 3$ $x^2 = \frac{2y + 3}{y - 1}$ $\frac{x}{+6 - \frac{3}{2} +}$	(ب) $y = \frac{2 x + 1}{ x - 2}$ $y(x - 2) = 2 x + 1$ $R_f = (-\infty, -\frac{1}{2}] \cup (2, +\infty)$ $y x - 2 x = 2y + 1$ $x (y - 2) = 2y + 1$ $x = \frac{2y + 1}{y - 2}$ $\frac{x}{+6 - \frac{3}{2} +}$	۳
(الف) $y = \frac{1}{x^2 - 4x}$ $x^2 - 4x = \frac{1}{y}$ $(x-2)^2 - 4 = \frac{1}{y}$ $(x-2)^2 = \frac{1}{y} + 4$ $x - 2 = \pm \sqrt{\frac{1}{y} + 4}$ $x = 2 \pm \sqrt{\frac{1}{y} + 4}$ $R_f = (-\infty, -\frac{1}{4}] \cup (0, +\infty)$	(ب) $y = \frac{1}{x^2 - 4x}$ $x^2 - 4x = \frac{1}{y}$ $(x-2)^2 - 4 = \frac{1}{y}$ $(x-2)^2 = \frac{1}{y} + 4$ $x - 2 = \pm \sqrt{\frac{1}{y} + 4}$ $x = 2 \pm \sqrt{\frac{1}{y} + 4}$ $R_f = (-\infty, -\frac{1}{4}] \cup (0, +\infty)$	۴
(الف) $y = x^2 - 6x + 2$ $\text{Min} \mid -\frac{b}{2a} = \frac{3}{1} = 3$ $R_f = [-7, +\infty)$	(ب) $y = -x^2 + 4x + 2$ $\text{Max} \mid -\frac{b}{2a} = \frac{-4}{-2} = 2$ $R_f = (-\infty, 2]$	۵

$y = \sqrt{x^2 - 3x + 2}$ $\min \left -\frac{b}{2a} = \frac{3}{2} = 1.5 \right $ $R_f = \sqrt{[-1.5, +\infty)} = [0, +\infty)$	(الف)	$y = \sqrt{-x^2 + 4x + 1}$ $\max \left -\frac{b}{2a} = \frac{-4}{-2} = 2 \right $ $R_f = \sqrt{(-\infty, 14]} = [0, \sqrt{14}]$	(ب)	6
$y = x^4 + 3x^2 + 2x + 1$ $R_f = \mathbb{R}$	(ب)	$y = \sqrt{x^4 + 4x^2 + 7x + 1}$ $R_f = [0, +\infty)$	(ب)	7
$y = \frac{3x+1}{x-2}$ $R_f = \mathbb{R} - \{2\}$	(الف)	$y = \sqrt{\frac{x+1}{x+3}}$ $R_f = [0, +\infty) - \{2\}$	(ب)	8
$y = \frac{3x+1}{x-2}$ $x-2=0$ $x=2$ جانب قائم $y = \frac{a}{c} \rightarrow y = 3$ $y = \frac{a}{c} \rightarrow y = 3$ جانب افق	(الف)	$y = \frac{x-2}{1-2x}$ $1-2x=0$ $2x=1$ $x=\frac{1}{2}$ جانب قائم $y = \frac{a}{c} \rightarrow y = \frac{4}{-2} = -2$ $y = \frac{a}{c} \rightarrow y = -2$ جانب افق	(ب)	9
$y = \cos^2 x + \frac{1}{\cos^2 x}$ $R_f = [2, +\infty)$	(الف)	$y = \sqrt{\frac{x^2+1}{x}}$ $x > 0 \rightarrow R_f = [2, +\infty)$ $x < 0 \rightarrow R_f = (-\infty, -2]$ $R_f = (-\infty, -2] \cup [2, +\infty)$	(ب)	10