

(الف) $y = x^2 - 5 \rightarrow x^2 = y + 5$
 $x = \sqrt{y+5}$
 $x = y+5 > 0$
 $y > -5$
 $R_f = [-5, +\infty)$

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

(الف) $y = x^2 - 4x + 7$
 $y = (x-2)^2 + 3$
 $y-3 = (x-2)^2$
 $|x-2| = \sqrt{y-3}$
 $y-3 > 0 \rightarrow y > 3$
 $R_f = [3, +\infty)$

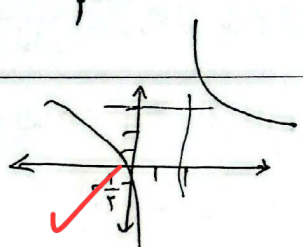
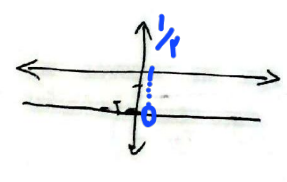
(ب) $y = x^2 - 5x + 1$
 $y = (x + \frac{5}{2})^2 - \frac{25}{4} + 1$
 $(x + \frac{5}{2}, 5) = y + \frac{25}{4} - 1$
 $|x + \frac{5}{2}| = \sqrt{y + \frac{25}{4} - 1}$
 $y > -\frac{25}{4} + 1$
 $R_f = [-\frac{21}{4}, +\infty)$

$y = \frac{x^2 + 3}{x^2 - 2} \rightarrow \frac{x^2 + 3}{x^2 - 2} = y$
 $yx^2 - 2y = x^2 + 3 \Rightarrow x^2(y-1) = 2y+3$
 $x = \frac{\sqrt{2y+3}}{\sqrt{y-1}} \Rightarrow R_f = (-\infty, \frac{3}{2}) \cup (\frac{3}{2}, +\infty)$
 $y = \frac{2x^2 + 2}{x^2 - 4} \Rightarrow y|x^2 - 4| = 2x^2 + 2$
 $|x^2 - 4| = \frac{2y+1}{y-2} \Rightarrow |x^2 - 4| = \frac{2y+1}{y-2}$
 $|x| = \sqrt{\frac{2y+1}{y-2}}$
 $R_f = (-\infty, -\frac{1}{2}) \cup (\frac{1}{2}, +\infty)$

(الف) $y = \frac{1}{x^2 - 4x} = \frac{1}{(x-2)^2 - 4}$
 $D_f = U(\frac{2}{3}, +\infty)$
 $x = \frac{2y \pm \sqrt{4y^2 + 4y}}{2y}$
 $R_f = \frac{1}{(-\infty, 0) \cup (4, +\infty)}$
 $R_f = (-\infty, -\frac{1}{4}] \cup (0, +\infty)$
 $\Delta \geq 0 \rightarrow 4y^2 + 4y \geq 0$
 $y \neq 0 \rightarrow y > -\frac{1}{4}$

$y = x^2 - 4x + 2 \rightarrow x = \frac{4 \pm \sqrt{16 - 4(y-2)}}{2}$
 $y = -\frac{1}{4}$
 $R_f = [-\frac{1}{4}, +\infty)$

$y = x^2 + 4x + 2 \rightarrow x = \frac{-4 \pm \sqrt{16 - 4(y-2)}}{2}$
 $y = 6$
 $R_f = [-6, +\infty)$

$y = \sqrt{x^2 - 7x + 12}$ $x^2 - 7x + 12 \geq 0$ $y = \frac{(b^2 - 4ac)}{4a} = -\frac{49}{4}$ (الف)	
$R_f = [0, \infty)$ ✓ $\sqrt{-\frac{49}{4} + \infty}$ (ب)	۶
$y = \sqrt{x^2 + 4x + 10}$ $-x^2 + 4x + 10 > 0$ $\frac{-(b^2 - 4ac)}{4a} = 14$ (الف)	
$R_f = [0, \sqrt{14}]$ ✓ $y = \sqrt{14 + \infty}$ (ب)	۷
$y = x^5 + 3x^4 + 2x + 1$ $R_f = R$ ✓ بزرگترین توان فرد است	
$y = \sqrt{x^4 + 4x^2 + 7x + 1} \Rightarrow \sqrt{R} \rightarrow R_f = [0, \infty)$ ✓ (ب)	۸
$y = \frac{3x+1}{1x-2}$ $R_f = R - \{2\}$ ✓ $\frac{x}{1} = 2$ (الف)	
$y = \sqrt{\frac{3x+1}{1x-2}} = \sqrt{R - \{2\}} \rightarrow [0, \infty) - \{2\}$ ✓ (ب)	۹
$y = \frac{3x+1}{x-2}$ 	
$x \neq \frac{1}{2}$ 	
$y = \cos^2 x + \frac{1}{\cos^2 x} \Rightarrow z^2 \geq 0$ $R_f = [2, \infty)$ ✓ (الف)	
$y = \sqrt{\frac{2x^2+1}{x}} \Rightarrow \frac{2x^2}{x} + \frac{1}{x} \Rightarrow x + \frac{1}{x} \Rightarrow R_f = \sqrt{[-\infty, -2] \cup [2, \infty)}$ (ب)	۱۰
$R_f = (-\infty, \sqrt{-2}] \cup [\sqrt{2}, \infty)$	