

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

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

الف) $y = x^2 - 4x + 4 \rightarrow y = x^2 - 4x + 4 + 2 \rightarrow y = (x-2)^2 + 2$
 $(x-2)^2 = y - 2 \rightarrow x - 2 = \pm \sqrt{y-2} \rightarrow x = \pm \sqrt{y-2} + 2$

$y - 2 \geq 0 \rightarrow y \geq 2 \rightarrow R_f = [2, +\infty)$
 ب) $x^2 - 5x + 1 - y = 0 \rightarrow x = \frac{-b \pm \sqrt{\Delta}}{2a} \rightarrow \Delta \geq 0 \rightarrow 25 - 4(1-y) \geq 0 \rightarrow 25 - 4 + 4y \geq 0 \rightarrow 21 + 4y \geq 0 \rightarrow y \geq -\frac{21}{4}$
 $R_f = [-\frac{21}{4}, +\infty)$

الف) $y = x^2 - 2y = x^2 + 3 \rightarrow y = x^2 + 3 \rightarrow x^2 = y - 3 \rightarrow x = \pm \sqrt{y-3} \rightarrow y-3 \geq 0 \rightarrow y \geq 3$
 $R_f = [3, +\infty)$
 ب) $y = |x| - 4y = 2|x| + 1 \rightarrow y = 2|x| + 1 \rightarrow |x| = \frac{y-1}{2} \rightarrow x = \pm \frac{y-1}{2}$
 $R_f = (-\infty, +\infty)$

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

Min $\left| \frac{-(-4)}{2} = 2 \right|$
 $R_f = [2, +\infty)$

Max $\left| \frac{-b}{2a} = -\frac{4}{-2} = 2 \right|$
 $R_f = (-\infty, 2]$

الف) $y = \sqrt{x^2 - 4x + 4} \rightarrow \min \left| \frac{-b}{2a} = \frac{4}{2} = 2 \rightarrow 9 - 18 + 2 = -7 \right.$
 $\sqrt{[-7, +\infty)} \Rightarrow R_f = [0, +\infty)$

ب) $\sqrt{-x^2 + 4x + 10} \rightarrow \max \left| \frac{-b}{2a} \rightarrow \frac{-4}{-2} = 2 \right.$
 $\sqrt{(-\infty, 14]} \rightarrow R_f = [0, 14]$

$-4 + 10 = 14$

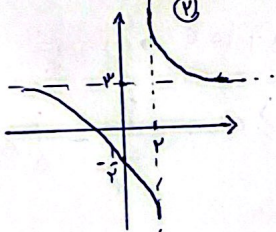
الف) $\rightarrow$ بزرگترین توان $\rightarrow R_f = \mathbb{R}$
 ذرات

ب) $\rightarrow$ در زیر را رسید $\rightarrow R_f = [0, +\infty)$
 توان فرد

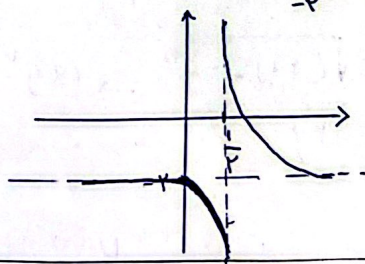
الف) $\rightarrow R_f = \mathbb{R} - \left\{ \frac{a}{c} \right\} = \mathbb{R} - \{3\}$
 $\downarrow \frac{3}{1} = 3$

ب) $\rightarrow R_f = [0, +\infty) - \{4\}$
 $\downarrow \frac{4}{1} = 4$

الف) $y = \frac{3x+1}{x-2}$ (در صورتی که $x \neq 2$)
 $\frac{a}{c} = \frac{1}{-2} = -\frac{1}{2}$



ب) $y = \frac{2x-2}{-2x+1}$
 $\frac{a}{c} = \frac{-2}{-2} = 1$



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

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