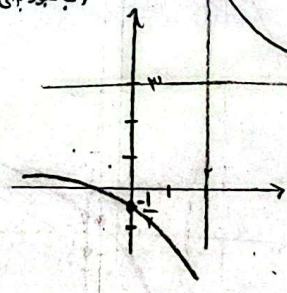
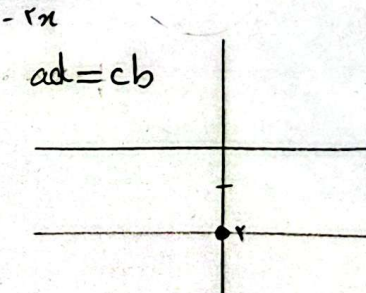


الف) $y = x^2 - 5$ $x^2 = y + 5$ $x = \pm \sqrt{y + 5} \geq 0$ $y \geq -5$ $R_f = [-5, +\infty)$	ب) $y = x^3 + 1$ $x^3 = y - 1$ $x = \sqrt[3]{y - 1}$ $R_f = \mathbb{R}$ فجیه فرد	۱
الف) $y = x^2 - 2x + 4$ $y = (x - 2)^2 + 2$ $y - 2 = (x - 2)^2$ $x - 2 = \pm \sqrt{y - 2}$ $x = \pm \sqrt{y - 2} + 2$ $y - 2 \geq 0$ $y \geq 2$ $R_f = [2, +\infty)$	ب) $y = x^2 - 2x + 1$ $\frac{-b}{2a} = \frac{1}{1}$ $y = (\frac{1}{1})^2 - 2(\frac{1}{1}) + 1 = \frac{1}{1} - \frac{2}{1} + 1$ $y = -\frac{1}{1}$ $a > 0$ $R_f = [-\frac{1}{1}, +\infty)$	۲
الف) $y = \frac{x^2 + 3}{x^2 - 2}$ $y(x^2 - 2) = x^2 + 3$ $yx^2 - 2y = x^2 + 3$ $yx^2 - x^2 = 2y + 3$ $x^2(y - 1) = 2y + 3$ $x^2 = \frac{2y + 3}{y - 1}$ $x = \pm \sqrt{\frac{2y + 3}{y - 1}}$ $\frac{2y + 3}{y - 1} \geq 0$ $R_f = (-\infty, -\frac{3}{2}] \cup (1, +\infty)$	ب) $y = \frac{2 x + 1}{ x - 2}$ $y x - 2y = 2 x + 1$ $y x - 2 x = 2y + 1$ $x (y - 2) = 2y + 1$ $x = \frac{2y + 1}{y - 2}$ $\frac{2y + 1}{y - 2} \geq 0$ $R_f = (-\infty, -\frac{1}{2}] \cup (2, +\infty)$	۳
$y = \frac{1}{x^2 - 2x}$ $yx^2 - 2xy = 1$ $yx^2 - 2xy - 1 = 0$ $\Delta \geq 0$ $\Delta = 4y^2 - 4(-1)(y) = 4y^2 + 4y$	$R_f = (-\infty, -\frac{1}{2}] \cup [0, +\infty)$	۴
الف) $y = x^2 - 4x + 2$ $a) \min x = \frac{-b}{2a} = \frac{4}{2} = 2$ $9 - 16 + 2 = -5$ $R_f = [-5, +\infty)$	ب) $y = -x^2 + 4x + 2$ $a) \max x = \frac{-b}{2a} = \frac{-4}{-2} = 2$ $-4 + 16 + 2 = 14$ $R_f = (-\infty, 14]$	۵

الف) $y = \sqrt{x^2 - 4x + 4}$ ا) $x = \frac{b}{2a} = \frac{4}{2} = 2$ min $9 - 11 + 2 = -2$ $R_f = [0, +\infty)$ $\sqrt{[-2, +\infty)} = [-2, +\infty)$	ب) $y = \sqrt{-x^2 + 4x + 10}$ ا) $x = \frac{b}{2a} = \frac{-4}{-2} = 2$ max $-4 + 11 + 10 = 17$ $R_f = [0, 14]$ $\sqrt{(-\infty, 14]} = [0, 14]$
الف) $y = x^2 + 3x^2 + 2x + 1$ $R_f = \mathbb{R}$	ب) $y = \sqrt{x^2 + 4x + 1}$ $R_f = \sqrt{\mathbb{R}} = [0, +\infty)$ $R_f = [0, +\infty)$
الف) $y = \frac{3x+1}{x-2}$ $R_f = \mathbb{R} - \{ \frac{a}{c} \}$ $ad \neq cb$ $R_f = \mathbb{R} - \{ \frac{3}{1} \}$	ب) $y = \sqrt{\frac{4x+1}{x+3}}$ $R_f = \mathbb{R} - \{ \frac{a}{c} \}$ $ad \neq cb$ $R_f = \sqrt{\mathbb{R} - \{ \frac{4}{3} \}}$ $R_f = [0, +\infty) - \{ \frac{4}{3} \}$
الف) $y = \frac{3x+1}{x-2}$ $R_f = \mathbb{R} - \{ \frac{a}{c} \}$ $ad \neq cb$ مقام = $x - 2 = 0 \Rightarrow x = 2$ مقام = $\frac{a}{c} = \frac{3}{1} = 3$ $x = 0 \Rightarrow \frac{1}{-2} = -\frac{1}{2}$ 	ب) $y = \frac{4x-2}{1-2x}$ $y = \frac{4x-2}{-2x+1}$ $ad = cb$ $\frac{4x-2}{-2x+1} = -2$ 
الف) $y = \cos^2 x + \frac{1}{\cos^2 x}$ $\cos^2 x > 0 \Rightarrow \cos^2 x + \frac{1}{\cos^2 x} > 2$ $R_f = [2, +\infty)$	ب) $y = \sqrt{\frac{x^2+1}{x}}$ $\sqrt{\frac{x^2+1}{x}} = \sqrt{\frac{x^2}{x} + \frac{1}{x}} = \sqrt{x + \frac{1}{x}}$ $x + \frac{1}{x} > 0 \wedge x + \frac{1}{x} < 0$ $R_f = \sqrt{(-\infty, -1] \cup [1, +\infty)} = (-\infty, \sqrt{-1}] \cup [\sqrt{1}, +\infty)$