

الف) $x^r = y + a$ $x = \pm \sqrt[r]{y+a}$ $R_f = [-a, +\infty)$
 ب) $x^r = y - 1$ $x = \sqrt[r]{y-1}$ $R_f = \mathbb{R} - (-\infty, +\infty)$ **R**

الف) $y = x^r - rx + r + 1$ $y = (x-r)^r + r$ $(x-r)^r = y-r$ $x = \pm \sqrt[r]{y-r} + r$ $R_f = [r, +\infty)$
 ب) $x^r - rx + (1-y) = 0$ $\Delta = r^2 - 4(1-y) = r^2 - 4 + 4y \geq 0$ $4y \geq 4 - r^2$ $y \geq \frac{4-r^2}{4} = 1 - \frac{r^2}{4}$
 $R_f = [1 - \frac{r^2}{4}, +\infty)$

الف) $x^r + r = yx^r - ry$ $x^r - yx^r = -ry - r$ $x^r(1-y) = -r(y+1)$ $x^r = \frac{-r(y+1)}{1-y}$ $x^r = \frac{r(y+1)}{1-y}$
 $x = \pm \sqrt[r]{\frac{r(y+1)}{1-y}}$ $R_f = (-\infty, -\frac{1}{r}] \cup (1, +\infty)$

ب) $r|x| + 1 = y|x| - ry$ $r|x| - y|x| = -ry - 1$ $|x|(r-y) = -ry - 1$ $|x| = \frac{-ry-1}{r-y} = \frac{ry+1}{y-r}$
 $x = \pm \frac{ry+1}{y-r}$ $R_f = (-\infty, -\frac{1}{r}] \cup (r, +\infty)$

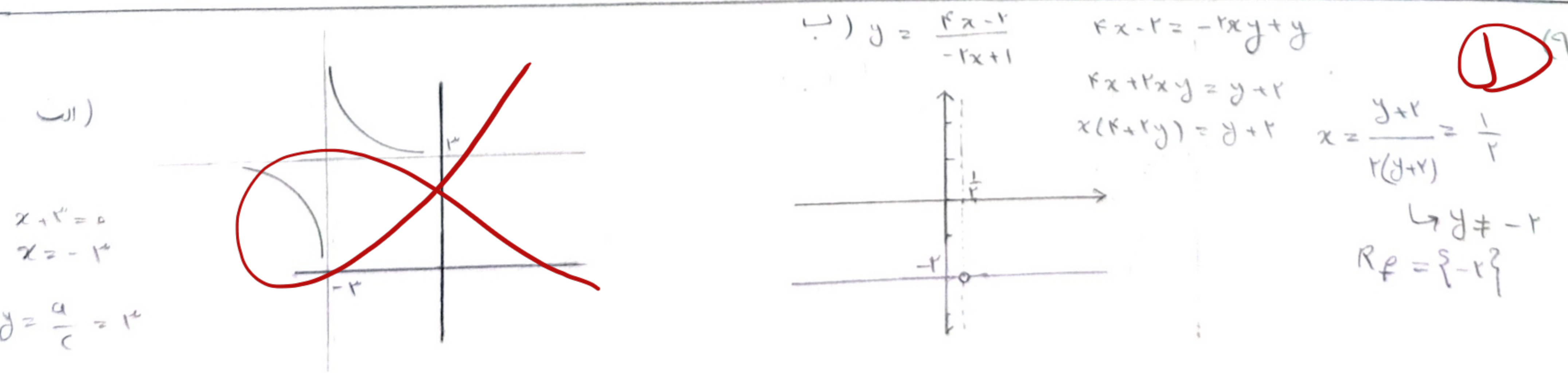
الف) $y = \frac{1}{x^r - rx}$ $y(x^r - rx) - 1 = 0$ $\Delta = 14y^2 - 4y \geq 0$
 $4y(4y-1) \geq 0$
 $4y = 0$ $4y-1 = 0$
 $y = 0$ $y = \frac{1}{4}$
 $R_f = (-\infty, -\frac{1}{r}] \cup [\frac{1}{4}, +\infty)$

الف) $a > 0$ $x_{\min} = \frac{4}{r} = r^2$ $R_f = [-V, +\infty)$
 $y_{\min} = 9 - 18 + r = -9$
 ب) $a < 0$ $x_{\max} = \frac{-r}{-r} = 1$ $R_f = (-\infty, 4]$
 $y_{\max} = -r + 18 + r = 18$

الف) $a > 0$ $x_{\min} = \frac{4}{r} = r^2$ $R_f = [0, +\infty)$
 $y_{\min} = 9 - 18 + r = -9 \rightarrow [-9, +\infty) \xrightarrow{\sqrt{\cdot}} [0, +\infty)$
 ب) $a < 0$ $x_{\max} = \frac{-r}{-r} = 1$ $R_f = [0, \sqrt{18}]$
 $y_{\max} = -r + 18 + 1 = 19 \rightarrow (-\infty, 19] \xrightarrow{\sqrt{\cdot}} [0, \sqrt{18}]$

الف) $R_f = \mathbb{R}$ ب) $R_f = [0, +\infty)$

الف) $ad \neq bc \rightarrow r \neq 1$ $\frac{a}{c} = r$ $R_f = \mathbb{R} - \{\frac{a}{c}\}$ $R_f = \mathbb{R} - \{r\}$
 ب) $1 \neq 1$ $\frac{a}{c} = r$ $\mathbb{R} - \{r\} \xrightarrow{\sqrt{\cdot}} [0, +\infty) - \{r\}$ $R_f = [0, +\infty) - \{r\}$



$$a) \quad a = \frac{1}{a} \quad a > 0$$

$$R_f = [1, +\infty)$$

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$$b) \quad \sqrt[10]{\frac{x^2}{x} + \frac{1}{x}} = \sqrt[10]{x + \frac{1}{x}}$$

$$R_f = (-\infty, -1] \cup [1, +\infty)$$

$$x > 0 \rightarrow (\sqrt[10]{x}, +\infty)$$

$$x < 0 \rightarrow (-\infty, \sqrt[10]{-x})$$