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الف $x^2 = y + a$ $x = \pm \sqrt{y+a}$ $R_f = [-a, +\infty)$
 ب $x^2 = y - 1$ $x = \pm \sqrt{y-1}$ $R_f = \mathbb{R}$

الف $y = x^2 - 4x + 4$ $y = (x-2)^2 + 0 \rightarrow y = (x-2)^2 \rightarrow x = \pm \sqrt{y} + 2$ $R_f = [0, +\infty)$
 ب $y = x^2 - 2x + 1$ $y = (x - \frac{a}{b})^2 - \frac{c}{d} = \pm \sqrt{y + \frac{1}{4}} + \frac{a}{b} = x$ $R_f = [-\frac{1}{4}, +\infty)$

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الف $x^2 + y = yx^2 - 4y$ $x^2 - yx^2 = -4y - y$ $x^2(1-y) = -5y$
 $x^2 = \frac{-5y - y^2}{1-y}$ $x = \pm \sqrt{\frac{1-y-y^2}{y-1}}$ $R_f = (-\infty, \frac{1}{2}] \cup (1, +\infty)$

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ب $|x| + 1 = y|x| - 4y$ $|x| - y|x| = -4y - 1$ $|x|(1-y) = -4y - 1$
 $|x| = \frac{-4y-1}{1-y}$ $x = \pm \frac{4y+1}{y-1}$ $R_f = (-\infty, -\frac{1}{4}] \cup [1, +\infty)$

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الف $y = \frac{1}{x^2 + 2x}$ $yx^2 - 2yx - 1 = 0$ $\Delta = 4y^2 - 4y > 0$
 $4y(y-1) > 0$
 $y < 0$ $y > 1$
 $y = 0$ $y = 1$
 $R_f = (-\infty, -\frac{1}{2}] \cup [0, +\infty)$

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الف $a > 0$ $x_{min} = \frac{a}{r} - r$ $R_f = [-V, +\infty)$
 $y_{min} = a - 1A + r = -V$

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ب $a < 0$ $x_{max} = \frac{a}{r} - r$ $R_f = (-\infty, y]$
 $y_{max} = -a - 1A + r = y$

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الف $a > 0$ $x_{min} = \frac{1}{r} - r$
 $y_{min} = a - 1A + r = -V \rightarrow [-V, +\infty) \rightarrow R_f = [0, +\infty)$

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ب $a < 0$ $x_{max} = \frac{-1}{r} - r$
 $y_{max} = -a - 1A + r = 11 \rightarrow (-\infty, 11] \rightarrow R_f = [0, 11]$

11, 20

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

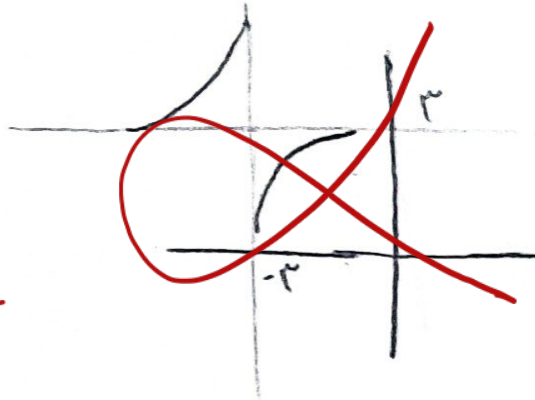
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✓

الف، $ad - bc - 4 \neq 1$ $\frac{a}{c} = 2$ $R_f = \mathbb{R} - \{\frac{a}{c}\}$ $R_f = \mathbb{R} - \{2\}$ (1)
 ب) $12 \neq 1$ $\frac{a}{c} = 4$ $\mathbb{R} - \{4\}$ $\sqrt{}$ $[0, +\infty) - \{4\}$ $R_f = [0, +\infty) - \{4\}$ (2)

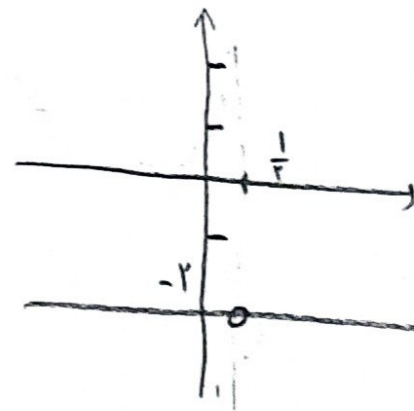
الف

$x = 2 = 0$
 $x = -2$
 $y = -\frac{a}{c} = -2$



ب) $y = \frac{x-2}{-2x+1}$

(3)



$x-2 = -2xy+2$

$x+2xy = y+2$

$x(1+2y) = y+2$

$x = \frac{y+2}{1(1+2y)} = \frac{1}{1+2y}$

$y \neq -1/2$

$R_f = \{-1/2\}$

الف، $a + \frac{1}{a}$ $a > 0$ $R_f = [2, +\infty)$

(4)

ب) $\sqrt{\frac{x^2}{x} + \frac{1}{x}} = \sqrt{x + \frac{1}{x}}$

$R_f = (-\infty, -2] \cup [2, +\infty)$

$x > 0 \rightarrow (\sqrt{2}, +\infty)$

$x < 0 \rightarrow (-\infty, -\sqrt{2})$