

الف) $y = x^2 - \omega$

$x^2 = y + \omega$

$x = \pm \sqrt{y + \omega} \geq 0$

$y \geq -\omega$

$R_f = [-\omega, +\infty)$

ب) $y = x^2 + 1$

$x^2 = y - 1$

$x = \pm \sqrt{y - 1}$

$R_f = \mathbb{R} \leftarrow$ فرد

سوال ۱) حوراء شریانی راد

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الف) $y = x^2 - 4x + 2$

$y = (x - 2)^2 + 2$

$y - 2 = (x - 2)^2$

$x - 2 = \pm \sqrt{y - 2} \quad y - 2 \geq 0$

$x = \pm \sqrt{y - 2} + 2 \quad y \geq 2$

$R_f = [2, +\infty)$

ب) $y = x^2 - 5x + 1$

$-\frac{b}{2a} = \frac{5}{2}$

$y = (\frac{5}{2})^2 - 5(\frac{5}{2}) + 1 = \frac{25}{4} - \frac{25}{2} + 1$

$y = -\frac{21}{4} \quad a > 0$

$R_f = [-\frac{21}{4}, +\infty)$

سوال ۲

الف) $y = \frac{x^2 + 3}{x^2 - 2}$

$y x^2 - 2y = x^2 + 3$

$y x^2 - x^2 = 2y + 3$

$x^2(y - 1) = 2y + 3$

$x^2 = \frac{2y + 3}{y - 1} \quad x = \pm \sqrt{\frac{2y + 3}{y - 1}} \quad \frac{2y + 3}{y - 1} \geq 0$

$\frac{-\frac{3}{2}}{1} \quad \frac{1}{0} \quad \frac{1}{1} \quad +$

$R_f = (-\infty, -\frac{3}{2}] \cup (1, +\infty)$

ب) $y = \frac{2|x| + 1}{|x| - 4}$

$y|x| - 4y = 2|x| + 1$

$y|x| - 2|x| = 4y + 1$

$|x| = \frac{4y + 1}{y - 2} \quad \frac{4y + 1}{y - 2} \geq 0 \quad \frac{-\frac{1}{4}}{2} \quad \frac{1}{0} \quad \frac{1}{2} \quad +$

$R_f = (-\infty, -\frac{1}{4}] \cup (2, +\infty)$

$y = \frac{1}{x^2 - 4x}$

$y x^2 - 4x y = 1$

$y x^2 - 4x y - 1 = 0 \quad \Delta \geq 0 \quad \Delta = 16y^2 - 4(-1)(y) = 16y^2 + 4y$

$\frac{-\frac{1}{4}}{0} \quad \frac{0}{1} \quad \frac{1}{1} \quad +$

$R_f = (-\infty, -\frac{1}{4}] \cup [0, +\infty)$

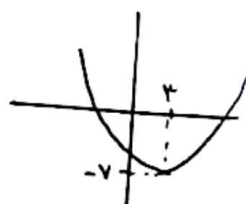
سوال ۳

الف) $y = x^2 - 4x + 2$

$a > 0$

$\min \quad x = -\frac{b}{2a} = \frac{4}{2} = 2$

$9 - 16 + 2 = -5$



$R_f = [-5, +\infty)$

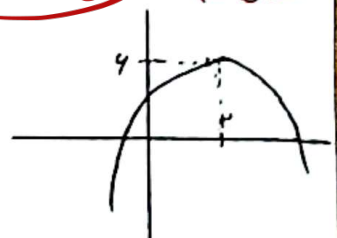
ب) $y = -x^2 + 4x + 2$

$a < 0$

$\max \quad x = -\frac{b}{2a} = \frac{-4}{-2} = 2$

$-4 + 16 + 2 = 14$

$R_f = (-\infty, 14]$



سوال ۴

$$y = \sqrt{x^2 - 4x + 4}$$

$$a > 0$$

$$\min \left| \begin{array}{l} x - \frac{b}{a} = \frac{y}{r} = r \\ 4 - 4x + 4 = -4 \end{array} \right. \quad Rf = [0, +\infty)$$

$$\sqrt{[-4, +\infty)} = [0, +\infty)$$

$$\text{الف) } y = x^2 + 4x^2 + 4x + 1$$

$$Rf = \mathbb{R}$$

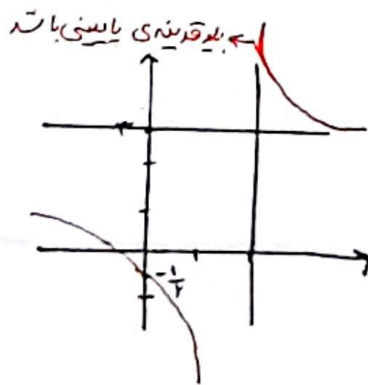
$$\text{الف) } y = \frac{x+1}{x-2} \quad Rf = \mathbb{R} - \left\{ \frac{a}{c} \right\}$$

$$ad \neq cb \quad Rf = \mathbb{R} - \left\{ \frac{a}{c} \right\}$$

$$\text{الف) } y = \frac{x+1}{x-2}$$

$$\begin{cases} ad \neq cb \\ x-2=0, x=2 \\ \frac{a}{c} = r \end{cases}$$

$$x=0 \rightarrow \frac{1}{-2} \neq \frac{1}{2}$$



$$\text{الف) } y = \cos^2 x + \frac{1}{\cos^2 x}$$

$$\cos^2 x > 0 \rightarrow \cos^2 x + \frac{1}{\cos^2 x} > 2$$

$$Rf = [2, +\infty)$$

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

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

$$x + \frac{1}{x} > 0 \leq x + \frac{1}{x} < 0$$

$$Rf = \sqrt{(-\infty, -2] \cup [2, +\infty)} = \sqrt{(-\infty, -\sqrt{2}] \cup [\sqrt{2}, +\infty)}$$

حورا کبریا بی زبان

$$\rightarrow \sqrt{-x^2 + 4x + 10}$$

$$a < 0$$

$$\max \left| \begin{array}{l} x - \frac{b}{a} = \frac{-f}{-r} = r \\ -x^2 + 4x + 10 = 14 \end{array} \right.$$

$$\sqrt{(-\infty, 4]} = [0, \sqrt{14}]$$

$$Df = [0, \sqrt{14}]$$

$$\text{ب) } y = \sqrt{x^2 + 4x^2 + 4x + 1}$$

$$Rf = \sqrt{1R} = [0, +\infty)$$

$$Rf = [0, +\infty)$$

$$\text{ب) } y = \sqrt{\frac{fx+1}{x+2}}$$

$$ad \neq b$$

$$Rf = \mathbb{R} - \left\{ \frac{a}{c} \right\}$$

$$Df = \sqrt{R} - \{f\}$$

$$Rf = [0, +\infty) - \{r\}$$

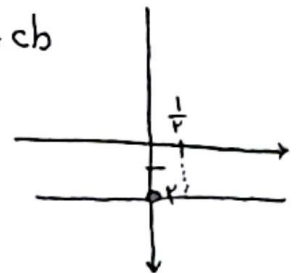
$$\text{ب) } y = \frac{4x-2}{1-2x}$$

$$y = \frac{4x-2}{1-2x} \quad ab = cb$$

$$\frac{4x-2}{1-2x} = -2$$

$$\frac{4x-2}{1-2x} = -2$$

$$1-2x \neq 0 \quad x \neq \frac{1}{2}$$



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