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Date :

Subject :

$$1 \text{ (الف) } y = x^2 - 5 \rightarrow x^2 = y + 5 \rightarrow x = \sqrt{y+5} \quad (1)$$

$$2 \rightarrow y + 5 \geq 0 \rightarrow y \geq -5 \rightarrow R_f = [-5, +\infty)$$

$$3 \text{ (ب) } y = x^2 + 1 \rightarrow y - 1 = x^2 \rightarrow \sqrt{y-1} = x \rightarrow R_f = \mathbb{R}$$

$$5 \text{ (الف) } y = x^2 - 4x + 4 \rightarrow y = x^2 - 4x + 4 + 2 \rightarrow y = (x-2)^2 + 2 \quad (2)$$

$$6 \rightarrow y - 2 = (x-2)^2 \rightarrow \sqrt{y-2} = x-2 \rightarrow \sqrt{y-2} + 2 = x$$

$$7 \rightarrow y \geq 2 \Rightarrow R_f = [2, +\infty)$$

$$9 \text{ (ب) } y = x^2 - 4x + 1 \rightarrow x^2 - 4x + 1 - y = 0$$

$$10 \frac{4 \pm \sqrt{16 - 4(1-y)}}{2} \rightarrow 4 \pm \sqrt{16 - 4(1-y)} \geq 0$$

$$12 \rightarrow 4 \geq 4 - 4y \rightarrow -4 \leq -4y \rightarrow y \geq -1$$

$$13 R_f = [-1, +\infty)$$

$$15 \text{ (الف) } y = \frac{x^2 + 3}{x^2 - 3} \rightarrow y(x^2 - 3) = x^2 + 3 \rightarrow yx^2 - x^2 = 2y + 3 \quad (3)$$

$$17 \rightarrow x^2(y-1) = 2y+3 \Rightarrow x^2 = \frac{2y+3}{y-1} \rightarrow x = \sqrt{\frac{2y+3}{y-1}}$$

$$19 \frac{-1.5}{+4} = \frac{-1.5}{+4} \rightarrow R_f = (-\infty, -1.5] \cup (1, +\infty)$$

$$\rightarrow y = \frac{r|x| + 1}{|x| - r} \rightarrow y|x| - ry = r|x| + 1 \rightarrow y|x| - r|x| = 1 + ry$$

$$\rightarrow |x| (y - r) = 1 + ry \rightarrow |x| = \frac{1 + ry}{y - r}$$

$$\frac{-\frac{1}{r}}{+1 - r^2} \rightarrow R = IR - \left[-\frac{1}{r}, r\right]$$

$$y = \frac{1}{x^r - rx} \rightarrow 1 = yx^r - ryx$$

$$\rightarrow yx^r - ryx - 1 = 0 \quad \Delta \geq 0$$

$$\rightarrow b^2 - 4ac \geq 0 \rightarrow 14y^2 - 4(-y) \geq 0$$

$$\rightarrow 14y^2 + 4y \geq 0 \rightarrow 4y(4y + 1) \geq 0 \rightarrow \frac{-\frac{1}{4}}{+1 - 14}$$

$$\rightarrow R = \left[-\frac{1}{4}, 0\right]$$

$$(الف) y = x^r - rx + r \quad a > 0 \rightarrow x_{min} = -\frac{b}{2a} = r \quad y_{min} = -V \rightarrow R_f = [-V, \infty)$$

$$\rightarrow y = -x^r + rx + r \quad a < 0 \rightarrow x_{max} = -\frac{b}{2a} = r \quad y_{max} = -V$$

$$R_f = (-\infty, 4]$$

1 الف) $y = \sqrt{x^2 - 4x + 2} \quad a > 0 \rightarrow \begin{cases} x_{\min} = -\frac{b}{2a} = 2 \\ y_{\min} = -1 \end{cases}$ (9)

3 $\rightarrow R_f = \sqrt{[-1, +\infty)} = [0, +\infty)$

5 ب) $y = \sqrt{-x^2 + 4x + 10} \quad a < 0 \rightarrow \begin{cases} x_{\max} = -\frac{b}{2a} = 2 \\ y_{\max} = 4 \end{cases}$

7 $R_f = \sqrt{(-\infty, 4]} \rightarrow [0, \sqrt{14}]$

9 الف) $y = x^2 + 3x^4 + 2x + 1$ برگشتن دایره $\rightarrow R_f = \mathbb{R}$ (✓)

11 ب) $y = \sqrt{x^5 + 4x^2 + 4x + 1}$ برگشتن دایره $\rightarrow R_f = \sqrt{\mathbb{R}}$
 $\rightarrow R_f = [0, +\infty)$

14 الف) $y = \frac{3x+1}{x-2}$ همگرایی $\rightarrow R_f = \mathbb{R} - \left\{ \frac{1}{3} \right\}$ (✓)

16 $\rightarrow R_f = \mathbb{R} - \left\{ \frac{1}{3} \right\}$

18 ب) $y = \sqrt{\frac{5x+1}{x+3}}$ $\rightarrow R_f = \sqrt{\mathbb{R} - 4} \rightarrow R_f = [0, +\infty) - \left\{ \frac{1}{3} \right\}$

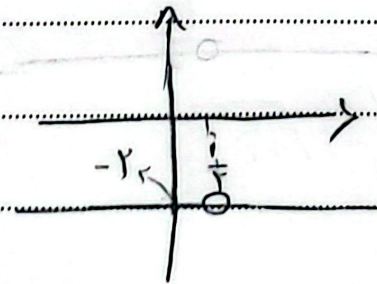
(الف) $y = \frac{2x+1}{x-2}$

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$\Rightarrow \begin{cases} \text{جانب قائم} = 2 \\ \text{انحنى} = 2 \end{cases}$

$\rightarrow y = \frac{2x-2}{1-2x} \rightarrow y = \frac{-2(-2x+1)}{-2x+1} \rightarrow y = -2, 1-2x \neq 0$
 $x \neq \frac{1}{2}$



(الف) $\cos^2 x \neq \frac{1}{\cos^2 x} \rightarrow R_f = [5, +\infty)$

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

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