

الف)  $y = x^3 - 3x^2 + 3x$   
 $(x-1)^3 + 1 : y-1 = (x-1)^3 \rightarrow x = \sqrt[3]{y-1} + 1 : R_f = \mathbb{R}$

ب)  $y = \frac{1}{x^2 - 3x + 2} : R_f = \mathbb{R} \setminus \{0\}$   
 $\Delta \geq 0 : 4y^2 + 4y > 0 \rightarrow 4y(y+1) > 0$   
 $\frac{-1}{2} < y < 0$  :  $R_f = (-\infty, -\frac{1}{2}) \cup (0, +\infty)$

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الف)  $y = x^2 - 4x + 1 : S \begin{cases} x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} : \frac{4 \pm \sqrt{16-4}}{2} = 2 \pm \sqrt{2} \\ \text{Min} = 4 - 16 + 1 = -11 \end{cases} : R_f = [0, +\infty)$   
 $y = \sqrt{4x - x^2} : S \begin{cases} -a + 1 = 9 \\ -a + 1 = 9 \end{cases} \rightarrow R_f = (-\infty, 9] \cup [0, 3]$

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ج)  $y = \sqrt{x^2 - 4x - 3} : S \begin{cases} x = \frac{4 \pm \sqrt{16+12}}{2} = 2 \pm \sqrt{7} \\ x = 2 - \sqrt{7} = -\sqrt{7} \end{cases} : R_f = [-\sqrt{7}, +\infty) \cup [0, +\infty)$

الف)  $y = x^3 - 3x^2 + 3x + 1 : R_f = \mathbb{R}$

ب)  $y = x^3 - 3x^2 + 3x + 2 : R_f = \mathbb{R}$

ج)  $y = \sqrt{x^3 - 3x^2 + 3x + 1} : R_f = [0, +\infty)$

د)  $y = (x^3 - 3x^2 + 3x + 1)^2 : R_f = [0, +\infty)$

الف)  $y = \frac{x+1}{x-2} : R_f = \mathbb{R} - \{2\}$

ب)  $y = \frac{x+1}{x+1} : R_f = \mathbb{R} - \{-1\}$

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الف)  $y = \sqrt{\frac{x+1}{x+1}} : R_f = \mathbb{R} - \{-1\} \Rightarrow [0, +\infty) - \{-1\}$

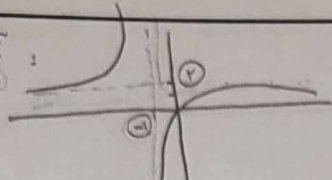
ب)  $y = \sqrt{\frac{x+1}{x-1}} : R_f = \mathbb{R} - \{-1\} \Rightarrow [0, +\infty)$

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الف)  $y = \frac{2x-3}{x+1}$

١- جانب مجزى  
٢- جانب افقى

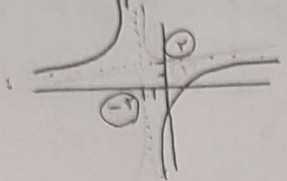


$R_f = \mathbb{R} - \{-1\}$

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جانب افقى: 2

ب)  $y = \frac{2x-1}{x+2}$   
١- جانب مجزى  
٢- جانب افقى



$R_f = \mathbb{R} - \{-2\}$

الف)  $y = \sin x + \frac{1}{\sin x}$  :  $R_f = (-\infty, -2] \cup [2, +\infty)$

ب)  $y = \frac{x^2+1}{x^3}$  :  $R_f = (-\infty, -2] \cup [2, +\infty)$

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

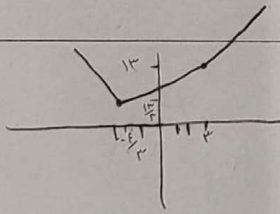
د)  $y = \sqrt{x} + \frac{1}{\sqrt{x}}$  :  $R_f = [2, +\infty)$

الف)  $y = x^2 + \frac{1}{x^2+3}$  :  $\rightarrow x^2 \rightarrow \min = 0$  :  $0 + \frac{1}{0+3} = \frac{1}{3}$  :  $R_f = [\frac{1}{3}, +\infty)$

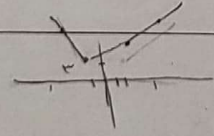
ب)  $y = \frac{x^2+5}{\sqrt{x^2+4}}$  :  $\rightarrow \min x^2 = 0$  :  $\frac{0+5}{\sqrt{0+4}} = \frac{5}{2}$  :  $R_f = [\frac{5}{2}, +\infty)$

$y = |x-3| + |2x+1|$

١-  $x-3 \geq 0$  :  $x \geq 3$   
٢-  $x-3 < 0$  :  $x < 3$   
٣-  $2x+1 \geq 0$  :  $x \geq -\frac{1}{2}$   
٤-  $2x+1 < 0$  :  $x < -\frac{1}{2}$



الف)  $y = |x-2| + |2x+1|$

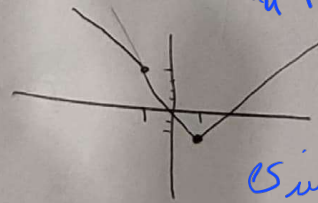


$R_f = [2, +\infty)$

$\frac{-1}{-2x} \mid x+1 \mid \frac{2}{2x}$

ب)  $y = |2x-2| - |x+1|$

١-  $2x-2 \geq 0$  :  $x \geq 1$   
٢-  $2x-2 < 0$  :  $x < 1$   
٣-  $x+1 \geq 0$  :  $x \geq -1$   
٤-  $x+1 < 0$  :  $x < -1$



$\Rightarrow R_f = [-2, +\infty)$

ساده

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