

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

ب) $y = \frac{1}{x^2 - 2x} \rightarrow x^2 y - 2xy - 1 = 0 \quad \Delta \geq 0 \quad (-2y)^2 - 4 \times y \times -1 = 4y^2 + 4y$
 $4y(y+1) \geq 0 \quad \frac{-\frac{1}{4}}{+\frac{1}{4} - \frac{1}{4} +} \quad R_f = (-\infty, -\frac{1}{4}] \cup [0, +\infty)$

الف) $y = x^2 - 4x + 10 \xrightarrow{a > 0} x = \frac{-b}{2a} = 2 \quad y = 2 \quad R_f = [2, +\infty)$

ب) $y = -x^2 + 4x + 3 \xrightarrow{a < 0} x = \frac{-b}{2a} = 2 \quad y = 11 \quad R_f = (-\infty, 11]$

ج) $y = \sqrt{x^2 - 4x - 3} \xrightarrow{a > 0} x = \frac{-b}{2a} = 2 \quad y = -5 \quad R_f = [0, +\infty)$

د) $y = \sqrt{4x - x^2} \xrightarrow{a < 0} x = \frac{-b}{2a} = 2 \quad y = 2 \quad R_f = [0, 2]$

الف) $y = x^3 - 5x^2 + 2x + 1 \quad \mathbb{R}$

ب) $y = x^4 - 4x^3 + 3x + 2 \quad \mathbb{R}$

ج) $y = \sqrt{x^4 - 4x^3 + 5x + 1} \quad [0, +\infty)$

د) $y = (x^3 - 4x^2 + 3x + 1)^2 \rightarrow \text{مربع} \quad [0, +\infty)$

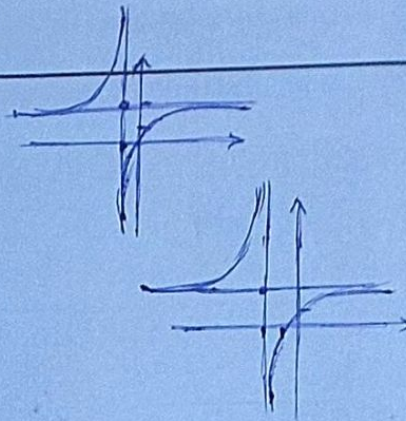
الف) $y = \frac{3x+1}{x-2} \quad \mathbb{R} - [2]$

ب) $y = \frac{2x+1}{x+1} \quad \mathbb{R} - [1]$

الف) $y = \sqrt{\frac{2x+2}{x+1}} \quad \sqrt{\mathbb{R} - [2]} \Rightarrow [0, +\infty) - [\sqrt{2}]$

ب) $y = \sqrt{\frac{3x+1}{1-x}} \quad \sqrt{\mathbb{R} - [-3]} \Rightarrow [0, +\infty)$

الف) $y = \frac{2x-3}{x+1}$ $\Rightarrow$ مجال $x = -1$
 $\Rightarrow$ مجال $y = 2$



ب) $y = \frac{2x-1}{x+2}$ $\Rightarrow$ مجال $x = -2$
 $\Rightarrow$ مجال $y = 2$

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

ب) $y = \frac{x^4+1}{x^3} \rightarrow x^3 + \frac{1}{x^3}$ $R_f = (-\infty, -2] \cup [2, +\infty)$

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

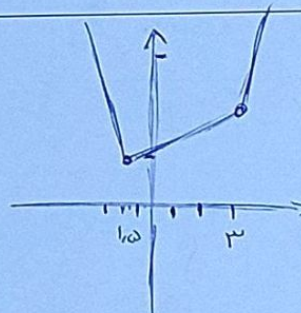
د) $\sqrt{x} + \frac{1}{\sqrt{x}}$ $R_f = [2, +\infty)$

الف) $y = x^2 + \frac{1}{x^2+3}$ $\rightarrow$ $\mathbb{R}$

ب) $y = \frac{x^2+5}{\sqrt{x^2+4}}$ $\rightarrow \sqrt{x^2+4} = +$ $y = \frac{++1}{+} = ++ \frac{1}{+}$
 $\rightarrow 2 + \frac{1}{2} = \frac{5}{2}$ $R_f = [\frac{5}{2}, +\infty)$

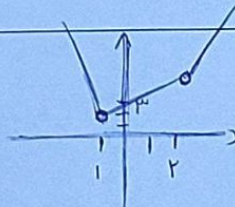
$y = |x-3| + |3x+4|$

$x-3-3x-4$	$-x-3+3x+4$	$x-3+3x+4$
$-4x-7$	$2x+1$	$4x+1$



الف) $y = |x-2| + |2x+2|$

$x-2-2x-2$	$-x-2+2x+2$	$x-2+2x+2$
$-3x-4$	x	$3x$



$R_f = [2, +\infty)$

ب) $y = |2x-2| - |x+1|$

$2x-2-x-1$	$-2x-2-x-1$	$2x-2-x-1$
$x-3$	$-3x-3$	$x-3$

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

