

الف) $y = x^2 - 2$

$x^2 = y + 2$

$x = \sqrt{y+2}$

$y+2 \geq 0$

$y \geq -2$

$[-2, +\infty)$

ب) $y = x^2 + 1$

$x^2 = y - 1$

$x = \sqrt{y-1}$

$y-1 \geq 0$

$y \geq 1$

$[1, +\infty)$

الف) $y = x^2 - 2x + 2$

$\rightarrow y = x^2 - 2x + 1 + 1 \rightarrow y = (x-1)^2 + 1$

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

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

$y-1 \geq 0$

$y \geq 1$

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

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

$[1, +\infty)$

ب)

الف) $y x^2 - 2y = x^2 + 3$

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

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

$x^2 = \frac{2y+3}{y-1}$

$y \neq 1$

$y-1 \neq 0$

$|x| = \frac{\sqrt{2y+3}}{\sqrt{y-1}}$

ب) $y|x| - 2y = 2|x| + 1$

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

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

$|R - \{2\}|$

$y \neq 2$

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

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

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

$\Rightarrow D_f = (-\infty, 0) \cup (2, +\infty)$

~~$x(yx - 2y) = 1$~~

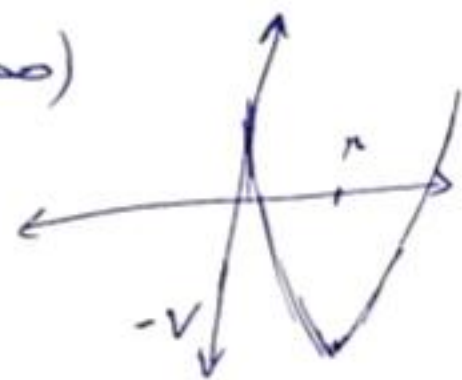
$R_f = \frac{1}{D_f} = \left(-\frac{1}{2}, +\infty\right) \cup (0, 2)$

الف) $y = x^2 - 4x + 2$

$\rightarrow x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{4 \pm \sqrt{16 - 4(1)(2)}}{2(1)}$

$\rightarrow y = \frac{-\Delta}{2a} = \frac{-20}{2} = -10$

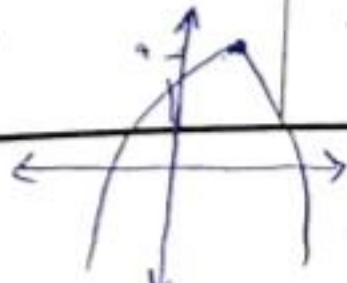
$R_f = [-10, +\infty)$



ب) $y = -x^2 + 2x + 2 \rightarrow x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{-2 \pm \sqrt{4 - 4(-1)(2)}}{2(-1)}$

$y = \frac{(14+1)}{-2} = -7.5$

$R_f = (-\infty, 2.5]$



$$1) y = \sqrt{x^2 - 4x + 2} \rightarrow y = \frac{-\Delta}{2a} = \frac{(24-1)}{2} = -V \Rightarrow \sqrt{[-V, +\infty)} \Rightarrow \mathbb{R} \setminus [0, +\infty)$$

$$2) y = \sqrt{-x^2 + 5x + 10} \rightarrow y = \frac{-\Delta}{2a} = \frac{-(14 - (\frac{25}{4}))}{-2} = 1\frac{1}{4} \Rightarrow \sqrt{(-\infty, 1\frac{1}{4})}$$

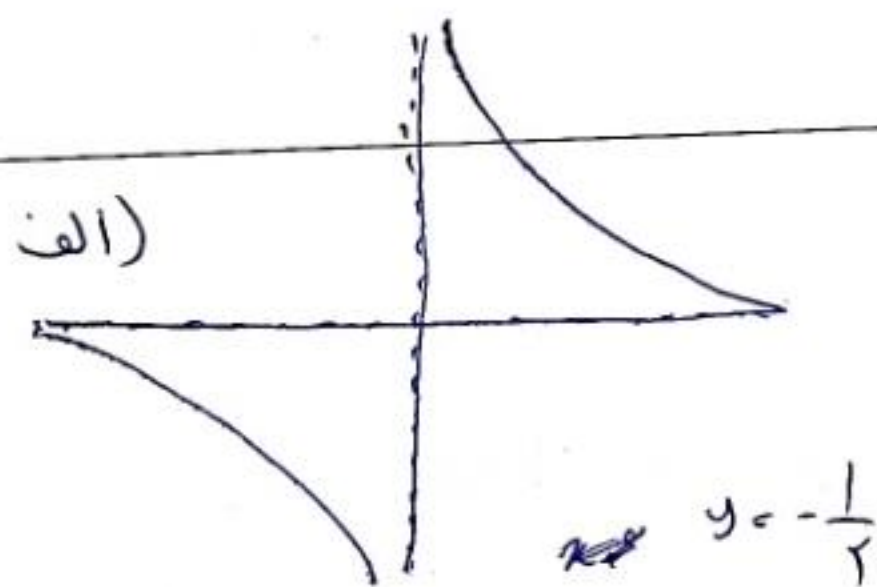
$$\mathbb{R} [0, \sqrt{1\frac{1}{4}}]$$

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

$$ب) y = \sqrt{x^3 + 5x^2 + 2x + 1} \Rightarrow \sqrt{\mathbb{R}} [0, +\infty)$$

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

$$ب) \sqrt{\frac{5x+1}{x+2}} \Rightarrow \sqrt{\mathbb{R} - \{2\}} \Rightarrow [0, +\infty) - \{2\}$$

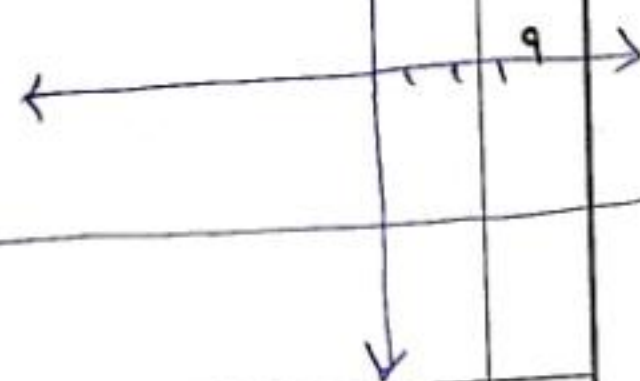


$$y = \frac{5x+1}{x-2}$$

$$ب) y = \frac{5x-2}{1-2x} \quad \frac{5x-2}{-2x+1}$$

$$\frac{2(2x-1)}{-(2x-1)} = -2$$

$$y = -2$$



$$الف) y = \cos^2 x + \frac{1}{\cos^2 x} \Rightarrow \mathbb{O}, 0 \Rightarrow [2, +\infty)$$

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