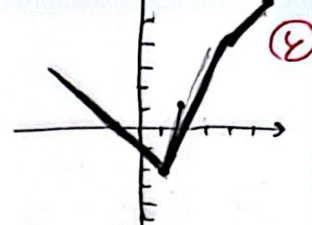


$$\text{الف) } y = |x-2| - |x-3|$$

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

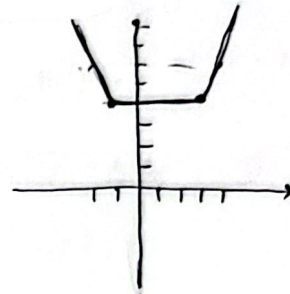
$$\begin{array}{c|c|c} 1 & 2 & 3 \\ \hline x-2 & x-2 & x-3 \\ \hline x-2 & -x-1 & x+1 \end{array}$$



$$\text{ب) } y = |x-2| + |x+1|$$

$$\begin{array}{c|c|c} -1 & 2 & \\ \hline x-2 & x-2 & x+1 \\ \hline -x-1 & x-1 & x+1 \end{array}$$

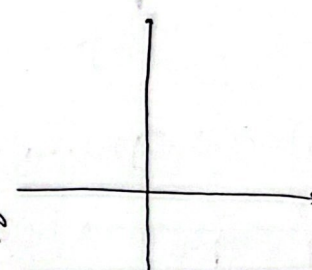
$$R_f = [1, +\infty)$$



$$|x-2| - |x+2| \leq 1$$

$$\begin{array}{c|c|c} -1 & 2 & \\ \hline x-2 & x-2 & x+2 \\ \hline x+2 & -x-2 & -x-2 \end{array}$$

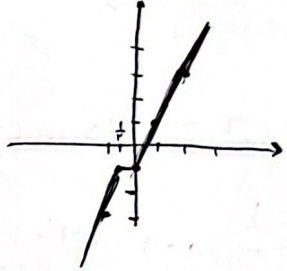
$$(-\infty, -3] \cap [-\frac{1}{2}, +\infty) \cap \emptyset \rightarrow R_f = (-\infty, -3] \cup [-\frac{1}{2}, +\infty)$$



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

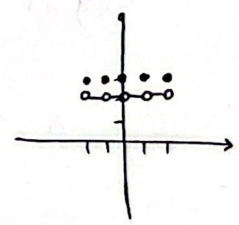
$$\begin{array}{c|c|c} -1 & 0 & 1 \\ \hline x-1 & x & x+1 \\ \hline x-1 & x & x+1 \end{array}$$

$$R_f = \mathbb{R}$$

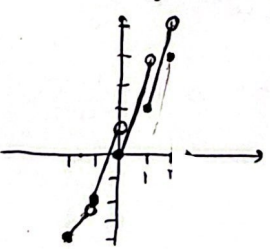


$$\text{الف) } y = [x] + [x-1] \rightarrow$$

$$R_f = \{1, 2\}$$



$$\text{ب) } z = x - [x]$$



$$[x, 1) \rightarrow x+1$$

$$[1, 2) \rightarrow x+1$$

$$[2, 3) \rightarrow x$$

$$[3, 4) \rightarrow x-1$$

$$x \rightarrow x$$

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

$$\sin^2 x \in [0, 1]$$

$$\sin^2 x = \frac{1}{2} \rightarrow \frac{1}{2} - \frac{1}{2} + \frac{1}{2} = \frac{1}{2}$$

$$R_f = [1, 2]$$

$$\text{ب) } \sin^2 x + \sin^2 x + 1$$

$$R_f = [1, 3]$$

$$\sin^2 x \in [0, 1]$$

$$\sin^2 x \in [0, 1]$$

$$\sin^2 x = -\frac{1}{2} \rightarrow \text{No solution}$$

الف) $y = \frac{|n|+1}{|n|-2}$ $|n|-2y = |n|+1 \rightarrow |n|(y-1) = 1+2y \rightarrow |n| = \frac{1+2y}{y-1} \rightarrow \frac{1+2y}{y-1} \geq \frac{-1}{y-1}$ (1)

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

ب) $y = \frac{n^2+1}{|n|}$

$y = |n| + \frac{1}{|n|} \rightarrow R_f = [1, +\infty)$
 $|n| > 0$ (2)

$y = \frac{n^2+2n-2}{n+2}$ $n^2+2y = n^2+2n-2 \rightarrow n^2 + (2-y)n + (-2-2y) = 0 \rightarrow \Delta = \frac{4-4(-2-2y)}{1} \geq 0$
 $(2-y)^2 - 4(-2-2y) \geq 0 \rightarrow y^2 + 4 - 4y + 8 + 8y \rightarrow y^2 + 4y + 12 \geq 0 \rightarrow (y+2)(y+6) \geq 0$
 $\frac{-2}{+6} - \frac{-2}{-6} \rightarrow R_f = (-\infty, -2] \cup [-6, +\infty)$

$y = \frac{n^2-n+\frac{1}{\varepsilon}}{n^2-n+1}$ $\Delta \rightarrow n^2-n+1 \neq 0 \rightarrow \Delta < 0 \rightarrow D_f = \mathbb{R}$ (3)

$x \rightarrow n^2-n = t \rightarrow y = \frac{t+\frac{1}{\varepsilon}}{t+1}$ $\frac{x^2-x}{(x-\frac{1}{\varepsilon})^2} = n^2 + \frac{1}{\varepsilon} - n$

$yt+y = t + \frac{1}{\varepsilon} \rightarrow t(y-1) = \frac{1}{\varepsilon} - y \rightarrow t = \frac{\frac{1}{\varepsilon}-y}{y-1} \rightarrow \frac{\frac{1}{\varepsilon}-y}{y-1} \geq -\frac{1}{\varepsilon}$

$\frac{\frac{1}{\varepsilon}}{y-1} + \frac{\frac{1}{\varepsilon}-y}{y-1} \geq 0 \rightarrow \frac{y-1+1-y}{\varepsilon(y-1)} \geq 0 \rightarrow \frac{-y}{\varepsilon(y-1)} \geq 0 \rightarrow \frac{1}{-\frac{1}{\varepsilon} + \frac{1}{\varepsilon}} \rightarrow [0, 1) \rightarrow R_f = [\frac{1}{\varepsilon}, 1)$

الف) $y = \sqrt{-n^2+2n-1}$ $\frac{\Delta}{4a} = \frac{-(1^2-4)}{-4} \rightarrow \frac{1^2}{4} = \frac{1}{4} \rightarrow (-\infty, 3] \xrightarrow{\text{نیرنگ}} [0, \sqrt{3}] \subset R_f$ (4)

ب) $y = \sqrt[n]{\frac{n^2+1}{n}}$ $\frac{n^2+1}{n} > 0 \rightarrow n + \frac{1}{n} > 0 \rightarrow [1, +\infty) \rightarrow R_f = [1, +\infty)$ (5)

$n > 0 \leq n < 0$
 عو

الف) $y = \sqrt[n]{n^3-n+1n}$ $(-\infty, +\infty)$ (6)

ب) $y = \sqrt[n]{2n^2-1n}$ $-\frac{\Delta}{4a} = \frac{-4^2}{1} = -4 \rightarrow [-4, +\infty) \rightarrow R_f = [-4, +\infty)$