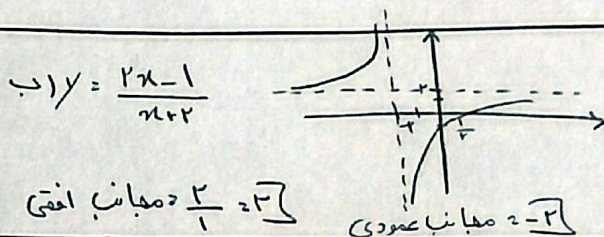
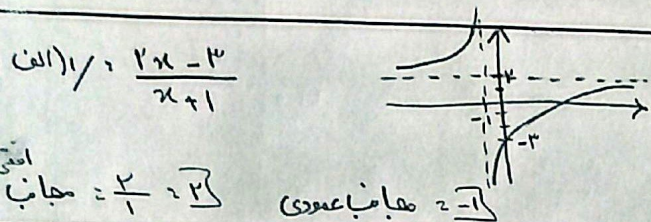


الف) $y = \sqrt{\frac{x+4}{x+1}}$ $R_f = \{R - \{-2\}\} \rightarrow [0, +\infty) - \sqrt{2}$

ب) $y = \sqrt{\frac{3x+1}{2-x}}$ $\rightarrow y = \sqrt{\frac{3x+1}{-x+2}}$ $R_f = \{R - \{-2\}\} \rightarrow [0, +\infty)$



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

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

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

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

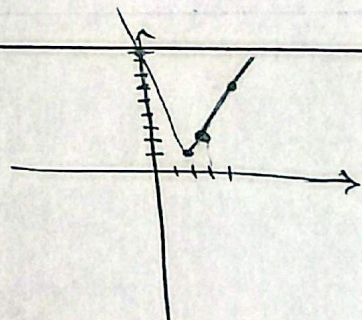
الف) $y = x^2 + \frac{1}{x^2+4} \rightarrow x^2 + \epsilon + \frac{1}{x^2+4} - \epsilon \rightarrow x^2 + \epsilon = 1 \rightarrow x^2 = 1 - \epsilon$ $\xrightarrow{x \rightarrow 0} x^2 = -\epsilon$ $\xrightarrow{x \rightarrow \infty} x^2 = 1 + \epsilon$ $\Rightarrow y = \frac{1}{\epsilon} - \epsilon = \frac{1}{\epsilon}$
 $R_f = [\frac{1}{4}, +\infty)$

ب) $y = \frac{x^2+4}{\sqrt{x^2+4}} \rightarrow \frac{\sqrt{(x^2+4)^2+1}}{\sqrt{x^2+4}} = \sqrt{x^2+4} + \frac{1}{\sqrt{x^2+4}} \rightarrow x^2 + \epsilon = 1 \rightarrow x^2 = 1 - \epsilon$ $\xrightarrow{x \rightarrow 0} x^2 = -\epsilon$ $\xrightarrow{x \rightarrow \infty} x^2 = 1 + \epsilon$ $\Rightarrow y = \frac{1}{\epsilon} - \epsilon = \frac{1}{\epsilon}$
 $\xrightarrow{x \rightarrow 0} \sqrt{4} + \frac{1}{\sqrt{4}} = \frac{5}{2}$ $R_f = [\frac{5}{2}, +\infty)$

$y = |x-2| + |3x-6|$

$\frac{-x+2-3x+6}{-4x+8}$ $\frac{-x+2+3x-6}{2x-4}$ $\frac{x-2+3x-6}{4x-8}$

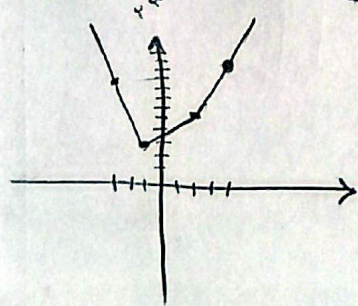
$R_f = [1, +\infty)$



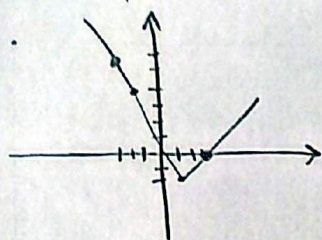
الف) $y = |x-2| + |2x+2|$

$\frac{-x+2-2x-2}{-3x}$ $\frac{-x+2+2x+2}{x+4}$ $\frac{x-2+2x+2}{3x}$

$R_f = [2, +\infty)$



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



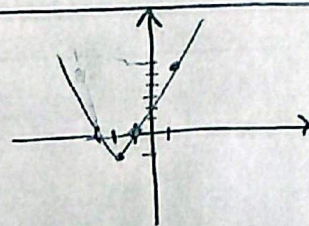
$$R_f = [-1, +\infty)$$

$$\begin{array}{c|c|c} -1 & & 1 \\ \hline \frac{-2x+1-x-1}{-x+0} & \frac{-2x+1-x-1}{-x+1} & \frac{2x-1-x-1}{x-1} \end{array}$$

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

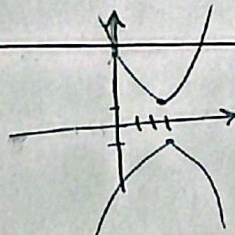
$$R_f = [-1, +\infty)$$

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



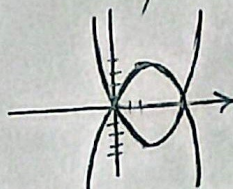
$$\text{الف) } |y| = x^2 - 9x + 10$$

$$\min \left| \frac{y}{x} \right|$$



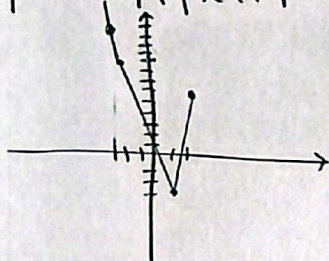
$$\Rightarrow |y| = |x^2 - 4x|$$

$$\min \left| \frac{y}{x} \right|$$



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

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

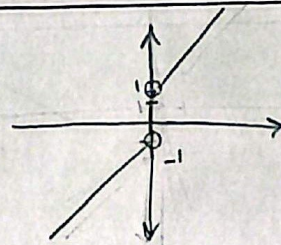


$$k = (9, +\infty) \cup \{-1\}$$

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

$$\text{الف) } y = x + \frac{x}{|x|}$$

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



$$\Rightarrow y = x|x| - \frac{x}{|x|}$$

$$\begin{array}{c|c} 0 & \\ \hline -x^2+1 & x^2-1 \end{array}$$

