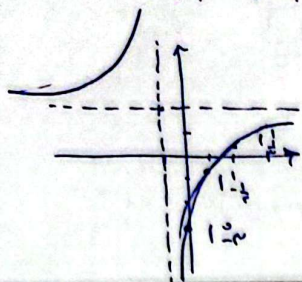
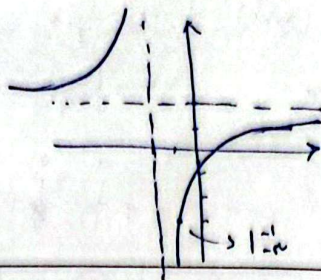


|                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                           |   |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
| <p>الف) <math>y = x^3 - 3x^2 + 3x - 1 + 1</math><br/> <math>\rightarrow y = (x-1)^3 + 1 \rightarrow y-1 = (x-1)^3</math><br/> <math>\sqrt[3]{y-1} = x-1 \rightarrow \sqrt[3]{y-1} + 1 = x</math><br/> <math>R_f = (-\infty, +\infty)</math></p>                                                                                                                                                              | <p><math>yx^2 - 2yx = 1 \rightarrow \frac{1}{y} = x^2 - 2x + 1 - 1</math><br/> <math>\rightarrow \frac{1}{y} + 1 = (x-1)^2 \rightarrow \sqrt{\frac{y+1}{y}} = x-1</math><br/> <math>x = \sqrt{\frac{y+1}{y}} + 1</math><br/> <math>R_f = (-\infty, -1) \cup (0, +\infty)</math></p>                                                                                                                       | 1 |
| <p>الف) <math>y = x^2 - 4x + 4</math> <math>\xrightarrow{a \geq 0}</math> <math>\begin{cases} x_{\min} = \frac{4}{2} = 2 \\ y_{\min} = 0 \end{cases}</math><br/> <math>R_f = [0, +\infty)</math></p> <p>ب) <math>y = -x^2 + 4x + 4</math> <math>\xrightarrow{a \leq 0}</math> <math>\begin{cases} x_{\max} = \frac{4}{-2} = -2 \\ y_{\max} = 12 \end{cases}</math><br/> <math>R_f = (-\infty, 12]</math></p> | <p>ب) <math>y = \sqrt{x^2 - 4x + 4}</math> <math>\xrightarrow{a \geq 0}</math> <math>\begin{cases} x_{\min} = \frac{4}{2} = 2 \\ y_{\min} = 0 \end{cases}</math><br/> <math>R_f = [0, +\infty)</math></p> <p>د) <math>y = \sqrt{4x - x^2}</math> <math>\xrightarrow{a \geq 0}</math> <math>\begin{cases} x_{\max} = \frac{4}{2} = 2 \\ y_{\max} = 2 \end{cases}</math><br/> <math>R_f = [0, 2]</math></p> | 2 |
| <p>الف) <math>y = x^2 - 2x + 1</math><br/> <math>R_f = \mathbb{R}</math></p> <p>ب) <math>R_f = \mathbb{R}</math></p> <p>ج) <math>R_f = [0, +\infty)</math></p> <p>د) <math>R_f = \mathbb{R} [1, +\infty)</math></p>                                                                                                                                                                                          | <p>1.5</p>                                                                                                                                                                                                                                                                                                                                                                                                | 3 |
| <p>الف) <math>y = \frac{x+1}{x-2} \rightarrow R_f = \mathbb{R} - \{2\}</math></p> <p>ب) <math>y = \frac{x+1}{x+1} \rightarrow R_f = \mathbb{R} - \{1\}</math></p>                                                                                                                                                                                                                                            | <p>5</p>                                                                                                                                                                                                                                                                                                                                                                                                  | 4 |
| <p>الف) <math>y = \sqrt{\frac{x+1}{x+1}} \rightarrow R_f = [0, +\infty) - \{\sqrt{2}\}</math> (ردس 2)</p> <p>ب) <math>y = \sqrt{\frac{x+1}{x-2}} \rightarrow R_f = (0, +\infty)</math> (ردس 2)</p>                                                                                                                                                                                                           | <p>5</p> <p>(توقف شده - 1.5)</p>                                                                                                                                                                                                                                                                                                                                                                          | 5 |

الف)  $y = \frac{x-3}{x+1}$   $\begin{matrix} \text{مجاورة} \rightarrow -1 \\ \text{مجاورة} \rightarrow 2 \end{matrix}$



ب)  $y = \frac{x-1}{x+2}$   $\begin{matrix} \text{مجاورة} \rightarrow -2 \\ \text{مجاورة} \rightarrow 2 \end{matrix}$



5

الف)  $R_f = (-\infty, -2] \cup [2, +\infty)$

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

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

د)  $y = \sqrt{x} + \frac{1}{\sqrt{x}} \rightarrow x > 0 \rightarrow R_f = [2, +\infty)$

5

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

$\frac{t(t+3)+1}{t+3} - \frac{1}{3} = y - \frac{1}{3}$

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

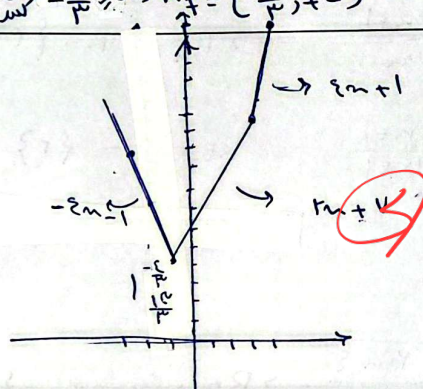
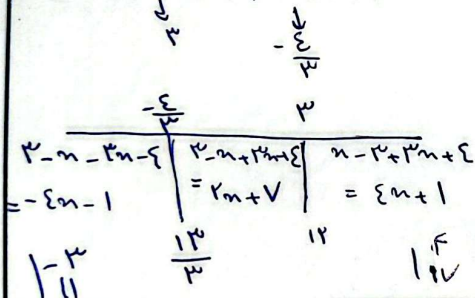
$\rightarrow y - \frac{1}{3} = \frac{t(t+2)}{(t+3)(3)}$   $x^2 \geq 0 \rightarrow \frac{t(t+2)}{3} \geq 0 \rightarrow \frac{t}{3} - \frac{1}{3} \geq 0 \rightarrow R_f = [\frac{1}{3}, +\infty)$

ب)  $\sqrt{x^2+1} + \frac{1}{\sqrt{x^2+1}} \rightarrow x_{min}^2 = 0 \rightarrow 1 + \frac{1}{1} = \frac{2}{1}$

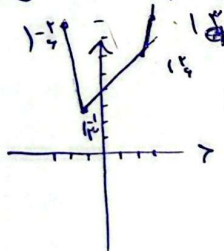
$\sqrt{x^2+1} \geq 0 \rightarrow R_f = [\frac{2}{1}, +\infty)$

5

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

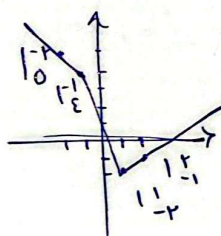


الف)  $y = |x-2| + |x+2|$



$R_f = [2, +\infty)$

ب)  $y = |x-2| - |x+1|$



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

10

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

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