

الف) $y = x^2 - 2x + 3$ $R_y = \mathbb{R}$
ب) $y = \frac{1}{x^2 - 2x}$ $x^2 - 2x - 1 = 0$
 $\Delta = 4 + 4 = 8$ $f_y(y+1) = \frac{-1 \pm \sqrt{1+4y}}{2}$ $(-\infty, -1] \cup [0, +\infty)$ 5

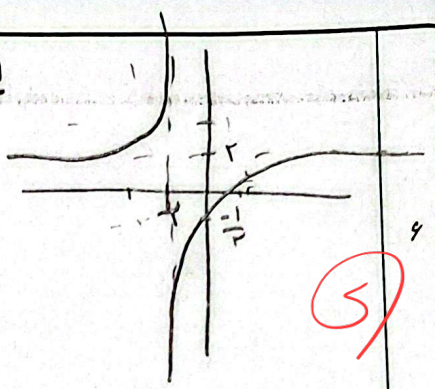
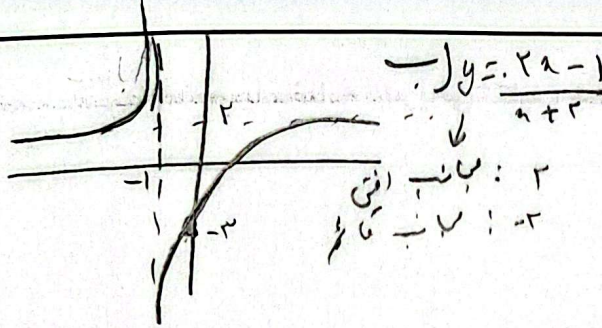
الف) $y = x^2 - 2x + 1$ $R_y = [0, +\infty)$
ب) $y = -x^2 + 2x + 3$ $-(x)^2 - f(x) + 1 = 9$ $R_y = (-\infty, 12]$ 6
ج) $y = \sqrt{x^2 - 2x - 3}$ $\frac{-b}{2a} = \frac{-1}{1} = -1$ $f - 1 - 3 = -4$ $[-4, +\infty)$ $\sqrt{}$
د) $y = \sqrt{2x - x^2}$ $\frac{-b}{2a} = \frac{-1}{-1} = 1$ $(-\infty, 1]$ $\sqrt{}$ $R_y = [0, 1]$

الف) $y = x^3 - 2x^2 + 2x + 1$ $R_y = \mathbb{R}$
ب) $y = x^3 - 2x^2 + 2x + 2$ $R_y = \mathbb{R}$ 7
ج) $y = \sqrt{x^3 - 2x^2 + 2x + 1}$ $R_y = [0, +\infty)$
د) $y = (x^3 - 2x^2 + 2x + 1)^2$ $R_y = [0, +\infty)$

الف) $y = \frac{3x+1}{x-2}$ $R_y = \mathbb{R} - \{3\}$
 $ad \neq cb, c \neq 0$ 8
ب) $y = \frac{2x+1}{x+1}$ $ad \neq cb, c \neq 0$
 $R_y = \mathbb{R} - \{2\}$

الف) $y = \sqrt{\frac{2x+1}{x+1}}$ $[0, +\infty) - \{\sqrt{2}\}$
 $ad \neq cb, c \neq 0$ 9
ب) $y = \sqrt{\frac{3x+1}{x-2}}$ $[0, +\infty) - \{\sqrt{3}\}$
 $ad \neq cb, c \neq 0$ $R_y = [0, +\infty)$
تقریب
نمونه

ا) $y = \frac{x-1}{x+1}$
 مخرج: -1
 مخرج: 2



5

ا) $y = \sin x + \frac{1}{\sin x}$ $-1 \leq \sin x \leq 1$ $R_y = (-\infty, -1] \cup [1, +\infty)$

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

5

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

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

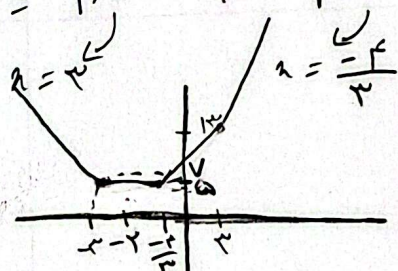
هـ) $y = x^2 + \frac{1}{x^2+1}$ $\checkmark x^2 + 1 + \frac{1}{x^2+1} - 1$ $R_y = [\frac{1}{2}, +\infty)$

و) $y = \frac{x^2+1}{\sqrt{x^2+1}} = \sqrt{x^2+1} + \frac{1}{\sqrt{x^2+1}}$

1, 0

$R_y = [1, +\infty)$

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



$x < -1$ $-1 < x < 1$ $x > 1$

$-x+1-x-1 = -2x$	$x-1+x+1 = 2x$	$x-1+x+1 = 2x$
$= -2x$	$= 2x$	$= 2x$
$\begin{cases} x+1 & x > 1 \\ 2x & -1 < x < 1 \\ -2x & x < -1 \end{cases}$	$\begin{cases} x+1 & x > 1 \\ 2x & -1 < x < 1 \\ -2x & x < -1 \end{cases}$	$\begin{cases} x+1 & x > 1 \\ 2x & -1 < x < 1 \\ -2x & x < -1 \end{cases}$

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$R_y = [\frac{1}{2}, +\infty)$

$R_y = [1, +\infty)$

ا) $y = |x-1| + |x+1|$

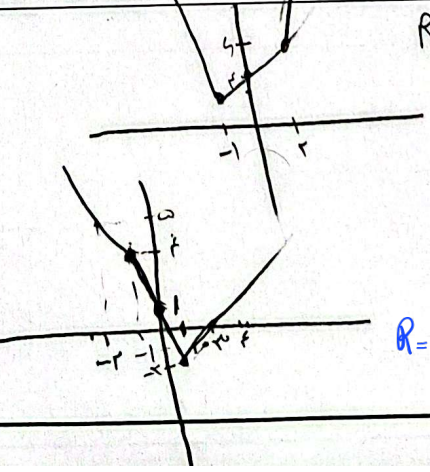
$x < -1$ $-1 < x < 1$ $x > 1$

$-x+1-x-1 = -2x$ $x-1+x+1 = 2x$ $x-1+x+1 = 2x$

ب) $y = |x-1| - |x+1|$

$x < -1$ $-1 < x < 1$ $x > 1$

$-x+1-x-1 = -2x$ $x-1-x-1 = -2$ $x-1-x-1 = -2$



1, 0

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

$$\sqrt{2^r + r} + \frac{1}{\sqrt{2^r + r}} \xrightarrow{2^r = \cdot} \frac{\alpha}{r} \quad R = \left[\frac{\alpha}{r}, +\alpha \right)$$

(ب^ا