

ا) $y = n^2 - 2n + 1 \xrightarrow{-1} (n-1)^2 + 1 = y \Rightarrow (n-1)^2 = y-1 \Rightarrow n-1 = \sqrt{y-1} \Rightarrow n = \sqrt{y-1} + 1$
 $R_y = \mathbb{R}$

ب) $y = \frac{1}{n^2 - 2n} \Rightarrow 1 = y n^2 - 2y n \Rightarrow y n^2 - 2y n - 1 = 0$
 $4y^2 + 4y \geq 0 \Rightarrow y^2 + y \geq 0 \Rightarrow y(y+1) \geq 0$
 $\frac{-1 \pm \sqrt{1+4}}{2} \rightarrow R_y = (-\infty, -1] \cup [0, +\infty)$

ا) $y = n^2 - 4n + 1$
 $\frac{c}{a} = 1$
 $\frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = 1$
 $R_y = [4, +\infty)$

ب) $y = -n^2 + 4n + 2$
 $\frac{c}{a} = 2$
 $\frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = 2$
 $R_y = (-\infty, 12]$

ج) $y = \sqrt{n^2 - 4n + 4}$
 $\frac{c}{a} = 1$
 $\frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = 1$
 $\sqrt{[-4, +\infty)} = [0, +\infty)$

د) $y = \sqrt{4n - n^2}$
 $\frac{c}{a} = 2$
 $\frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = 2$
 $\sqrt{(-\infty, 4]} = [0, 2]$

ا) $y = n^2 - 2n + 1$ $R_y = \mathbb{R}$

ب) $y = n^2 - 4n + 2$ $R_y = \mathbb{R}$

ج) $y = \sqrt{n^2 - 4n + 4}$ $R_y = [0, +\infty)$

د) $y = (n^2 - 4n + 1)^2$ $R_y = [0, +\infty)$

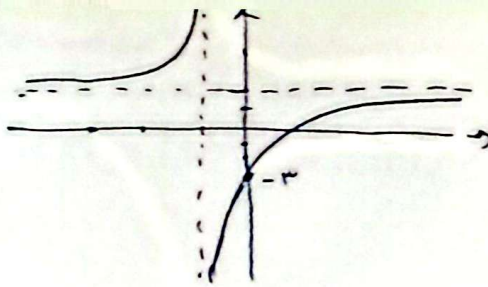
ا) $y = \frac{n+1}{n-1}$ $R_y = \mathbb{R} - \{1\}$

ب) $y = \frac{n+1}{n+1}$ $R_y = \mathbb{R} - \{1\}$

ا) $y = \sqrt{\frac{n+1}{n+1}}$ $R_y = [0, +\infty) - \{\sqrt{2}\}$

ب) $y = \sqrt{\frac{n+1}{1-n}} = \sqrt{\frac{n+1}{-n+1}}$ $R_y = [0, +\infty) - \{\sqrt{-1}\} \Rightarrow R_y = [0, +\infty)$
 $\bar{0} \bar{0} \bar{1} \bar{0}$

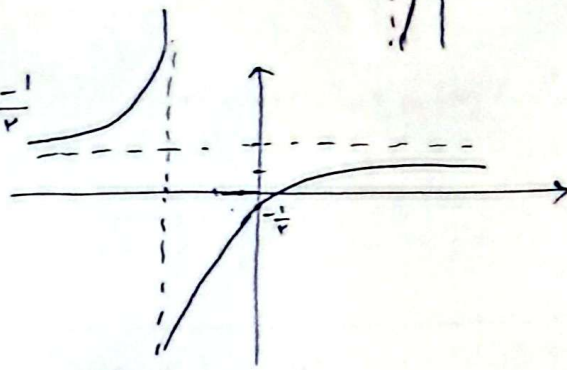
$$الف) y = \frac{2n-3}{n+1} \xrightarrow{n \rightarrow \infty} \frac{-3}{1} = -3$$



موجب اقتراب = 2

موجب اقتراب = -1

$$ب) y = \frac{2n-1}{n+2} \xrightarrow{n \rightarrow \infty} \frac{-1}{1} = -1$$



موجب اقتراب = 2

موجب اقتراب = -2

5

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

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

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

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

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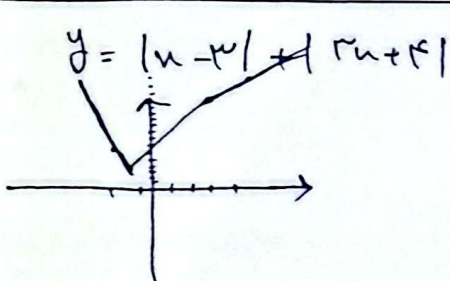
$$الف) y = n^2 + \frac{1}{n^2+2} + n-2 = n^2 + n + \frac{1}{n^2+2} - 2 \xrightarrow{n \rightarrow \infty} n^2 + \frac{1}{n^2} - 2 = \frac{1}{n^2}$$

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

$$ب) \frac{n+2}{\sqrt{n^2+2}} < \frac{n^2+2+1}{\sqrt{n^2+2}} = \frac{n^2+3}{\sqrt{n^2+2}} = \sqrt{n^2+2} + \frac{1}{\sqrt{n^2+2}} \xrightarrow{n \rightarrow \infty} \sqrt{n^2} + \frac{1}{\sqrt{n^2}}$$

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

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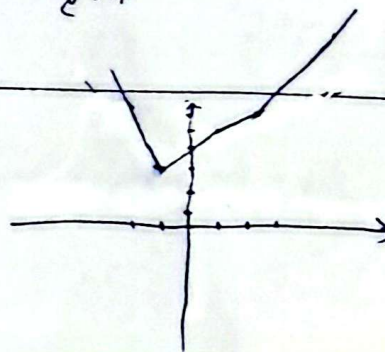
$-\frac{f}{g}$	n
$-n + 2 - 2n - 1$	$-n + 2 + 2n + 1$
$-3n + 1$	$3n + 3$
$-\frac{3}{3} = -1$	$\frac{3}{3} = 1$
$-\frac{1}{3} = -\frac{1}{3}$	$\frac{1}{3} = \frac{1}{3}$

$$-f(\frac{f}{g}) - 1 = \frac{1n}{2}$$

5

$$الف) y = |n-2| + |2n+1|$$

-1	2
$-n + 2 - 2n - 1$	$-n + 2 + 2n + 1$
$-3n + 1$	$3n + 3$
$-\frac{1}{3} = -\frac{1}{3}$	$\frac{3}{3} = 1$

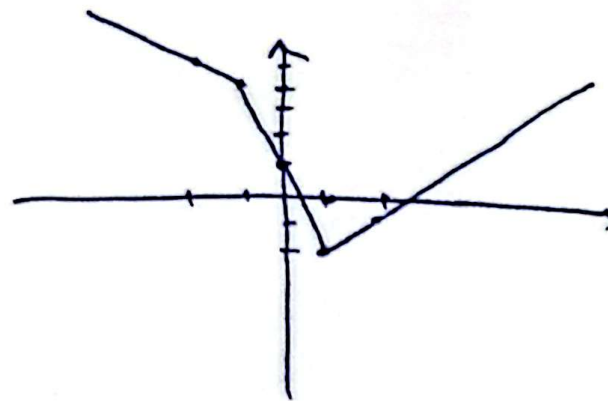


$$R_y = [2, +\infty)$$

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

-1		1	
$-2x + 2 + x + 1$	$-2x + 2 - x - 1$	$2x - 2 - x - 1$	
$-x + 3$	$-3x + 1$	$x - 3$	
-2	-1	1	3
ω	$\frac{1}{3}$	1	-1



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