

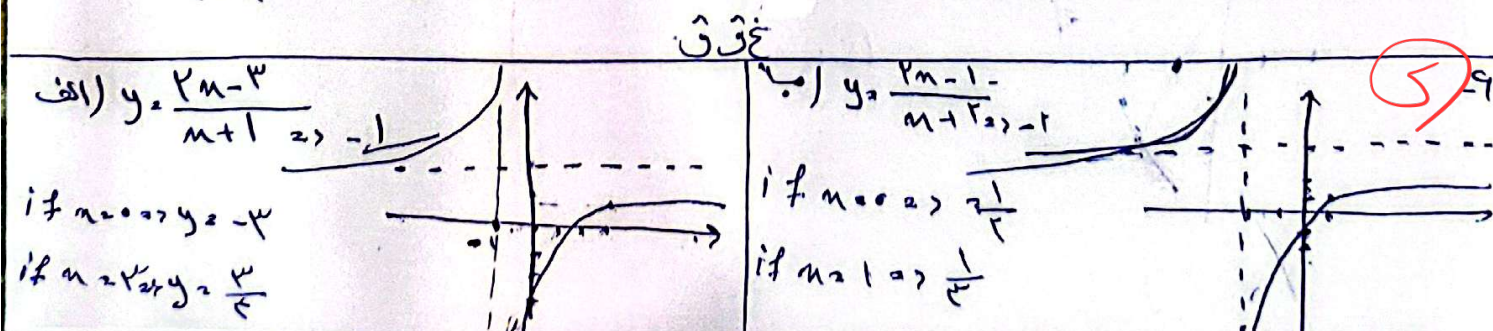
۱- الف) $y = n^3 - 3n^2 + 2n$ $R_y = \mathbb{R}$ ۵-۱
 ب) $y = \frac{1}{n^2 - 2n} \Rightarrow y(n^2 - 2n) = 1 \Rightarrow y(n^2 - 2n - 1) = 0 \Rightarrow y = \frac{1}{n^2 - 2n}$
 $(4y^2 + 4y) \geq 0 \Rightarrow 4(y^2 + y) \geq 0 \Rightarrow y^2 + y \geq 0 \Rightarrow y(y+1) \geq 0 \Rightarrow y \leq -1 \text{ or } y \geq 0$
 $R_y = (-\infty, -1] \cup [0, +\infty)$

الف) $y = n^2 - 4n + 1 \Rightarrow \left\{ \frac{-b}{2a} = \frac{4}{2} = 2 \right\} \Rightarrow R_y = [9, +\infty)$ ۵-۲
 $a > 0 \Rightarrow a \min$
 ب) $y = -n^2 + 9n + 4 \Rightarrow \left\{ \frac{-b}{2a} = \frac{-9}{-2} = 4.5 \right\} \Rightarrow R_y = (-\infty, 12.25]$
 $a < 0 \Rightarrow a \max$
 ج) $y = \sqrt{n^2 - 4n - 3} \Rightarrow \left\{ \frac{-b}{2a} = \frac{2}{2} = 1 \right\} \Rightarrow [-1, +\infty) \xrightarrow{\sqrt{\cdot}} [0, +\infty)$
 $a > 0 \Rightarrow a \min$
 د) $y = \sqrt{9n - n^2} \Rightarrow \left\{ \frac{-b}{2a} = \frac{4.5}{-1} = -4.5 \right\} \Rightarrow (-\infty, 9] \xrightarrow{\sqrt{\cdot}} [0, 3]$
 $a < 0 \Rightarrow a \max$

الف) $y = n^2 - 6n + 1 \Rightarrow R_y = \mathbb{R}$ ۵-۳
 ب) $y = n^2 - 4n + 2 \Rightarrow R_y = \mathbb{R}$
 ج) $y = \sqrt{n^2 - 4n + 1} \Rightarrow R_y = [0, +\infty)$
 د) $(n^2 - 4n + 1)^2 \Rightarrow R_y = [0, +\infty)$

الف) $y = \frac{2n+1}{n-2} \Rightarrow R_y = \mathbb{R} - \{2\}$ ۵-۴
 ب) $y = \frac{2n+1}{n+1} \Rightarrow R_y = \mathbb{R} - \{2\}$

الف) $y = \sqrt{\frac{2n+1}{n+1}} \Rightarrow R_y = [0, +\infty) - \{\sqrt{2}\}$ ۵-۵
 ب) $y = \sqrt{\frac{3n+1}{2-n}} \Rightarrow R_y = [0, +\infty) - \{\sqrt{2}\} \Rightarrow R_y = [0, +\infty)$



الف) $y = \sin n + \frac{1}{\sin n} \Rightarrow R_y = (-\infty, -1] \cup [1, +\infty)$ 5

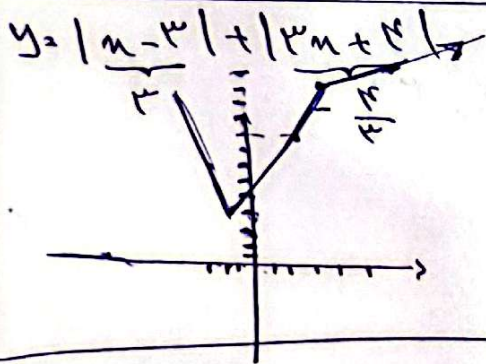
ب) $y = \frac{n^2 + 1}{n^2} \Rightarrow n^2 + \frac{1}{n^2} \Rightarrow R_y = [-\infty, -1] \cup [1, +\infty)$

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

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

$y = n^2 + \frac{1}{n^2 + 1} \Rightarrow n^2 + \frac{1}{n^2 + 1} + 1 - 1 \Rightarrow n^2 + 1 + \frac{1}{n^2 + 1} - 1 \xrightarrow{n \geq 1} y = \frac{1}{n^2} \Rightarrow R_y = [\frac{1}{n^2}, +\infty)$ 5

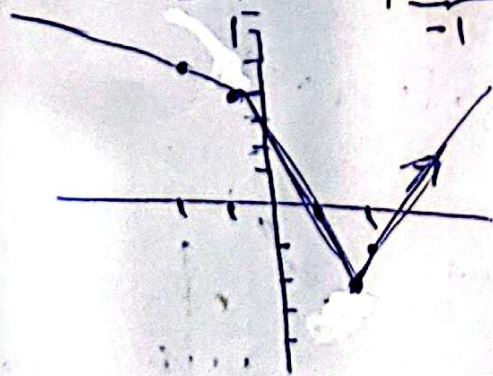
هـ) $y = \frac{n^2 + 6}{\sqrt{n^2 + 1}} \Rightarrow \frac{n^2 + 1 + 5}{\sqrt{n^2 + 1}} = \sqrt{n^2 + 1} + \frac{5}{\sqrt{n^2 + 1}} \xrightarrow{n \geq 1} \sqrt{1} + \frac{5}{\sqrt{1}} = 1 + 5 = 6$
 $R_y = [\frac{6}{n}, +\infty)$



$y = \frac{|n-1|}{1} + \frac{|n+1|}{1}$
 $\begin{matrix} -n+1 & n-1 \\ -n-1 & n+1 \end{matrix} \Rightarrow \begin{matrix} -n+1 & n-1 \\ -n-1 & n+1 \end{matrix} \Rightarrow \begin{matrix} -n+1 & n-1 \\ -n-1 & n+1 \end{matrix} \Rightarrow \begin{matrix} -n+1 & n-1 \\ -n-1 & n+1 \end{matrix}$
 $\begin{matrix} -1 & 1 \\ 1 & -1 \end{matrix} \Rightarrow \begin{matrix} -1 & 1 \\ 1 & -1 \end{matrix} \Rightarrow \begin{matrix} -1 & 1 \\ 1 & -1 \end{matrix} \Rightarrow \begin{matrix} -1 & 1 \\ 1 & -1 \end{matrix}$

$y = \frac{|n-1|}{1} + \frac{|n+1|}{-1} \Rightarrow \begin{cases} n-1 & n \geq 1 \\ n+1 & 1 \geq n \geq -1 \\ -n-1 & -1 \geq n \end{cases} \Rightarrow$ 5

و) $y = \frac{|2n-1|}{-1} - \frac{|n+1|}{-1} \Rightarrow \begin{cases} 1-2n & n \geq \frac{1}{2} \\ -2n+1 & \frac{1}{2} \geq n \geq -1 \\ -n+1 & -1 \geq n \end{cases} \Rightarrow$



$R_y = [-1, -\infty)$