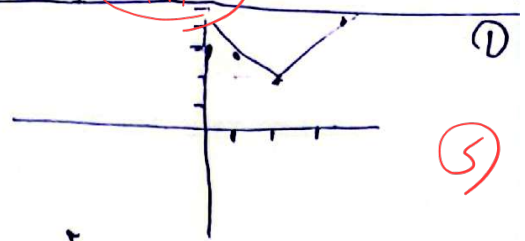


الف) $y = n + |2n - 4|$
 $n \geq 2$

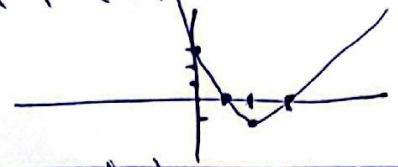
$\frac{2}{n-2} \mid n+2n-4 = 3n-4$
 $n-2$
 $R_f = [2, +\infty)$



ب) $y = \frac{|n-2|}{2} + \frac{|n-1|}{1} - \frac{|n|}{2}$

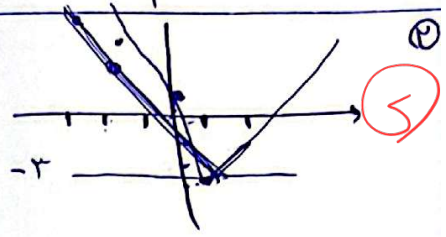
$\frac{0}{2} \mid \frac{1}{0} \mid \frac{2}{-1} \mid \frac{3}{0}$

$\frac{0}{-n+3} \mid \frac{1}{3-3n} \mid \frac{2}{1-n} \mid \frac{3}{n-2}$
 $R_f = [-1, +\infty)$



$\frac{1}{3n-4} - \frac{1}{n+2} = \frac{1}{2}$

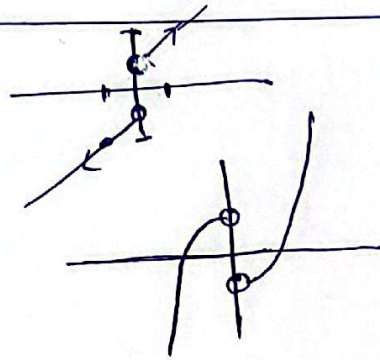
$\frac{-2}{6-2n} \mid \frac{1}{1-2n} \mid \frac{2}{2n-6}$
 $2 = -2$



$\frac{-2}{11} \mid \frac{-1}{9} \mid \frac{0}{1} \mid \frac{1}{-3} \mid \frac{2}{-1}$

الف) $y = n + \frac{n}{|n|}$

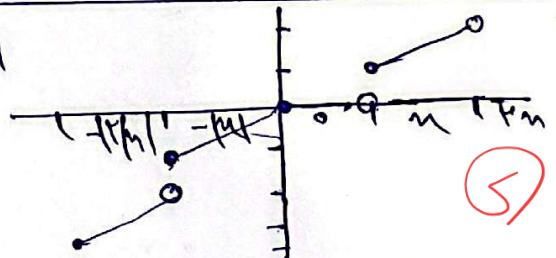
$\frac{0}{n-1} \mid \frac{1}{n+1}$
 $\frac{-1}{-1} \mid \frac{1}{1}$



ب) $y = |n| - \frac{n}{|n|} \neq 0$
 $\frac{0}{-n+1} \mid \frac{1}{n^2-1}$

الف) $y = [n] - 2n$

ب) $[n] |n|$



الف) $y = 3n - [3n] \Rightarrow 0 \leq n - [n] < 1 \Rightarrow 0 \leq 3n - [3n] < 1 \Rightarrow R_y = [0, 1)$

ب) $y = 4n - [4n] \Rightarrow 0 \leq n - [n] < 1 \Rightarrow 0 \leq 4n - [4n] < 1 \Rightarrow R_y = [0, 1)$

ج) $y = n - \omega \left[\frac{n}{\omega} \right] \Rightarrow \omega \left(\frac{n}{\omega} - \left[\frac{n}{\omega} \right] \right) \Rightarrow 0 \leq \frac{n}{\omega} - \left[\frac{n}{\omega} \right] < 1 \Rightarrow 0 \leq \omega \left(\frac{n}{\omega} - \left[\frac{n}{\omega} \right] \right) < \omega$
 $R_y = [0, \omega)$

د) $y = [2n] - 2n = -1 < [2n] - 2n < 0 \Rightarrow R_y = (-1, 0]$

الف) $y = 3 \sin n + 4 \cos n \Rightarrow \sqrt{9+16} \leq 3 \sin n + 4 \cos n \leq \sqrt{9+16}$
 $-\sqrt{17} \leq 3 \sin n + 4 \cos n \leq \sqrt{17} \Rightarrow R_y = [-\sqrt{17}, \sqrt{17}]$

5

ب) $y = 4 \sin n - 3 \cos n \Rightarrow \sqrt{16+9} \leq 4 \sin n - 3 \cos n \leq \sqrt{16+9} \Rightarrow R_y = [-5, 5]$

ج) $y = [2 \sin n + 6 \cos n] \Rightarrow \sqrt{4+36} \leq 2 \sin n + 6 \cos n \leq \sqrt{4+36} \Rightarrow R_y = [-\sqrt{40}, \sqrt{40}]$
 $-9 \leq [2 \sin n + 6 \cos n] \leq 9$

د) $y = \sqrt{\cos n - 2 \sin n} \Rightarrow \sqrt{0} \leq \cos n - 2 \sin n \leq \sqrt{0} \Rightarrow 0 \leq \sqrt{\cos n - 2 \sin n} \leq \sqrt{0}$
 $R_y = [0, \sqrt{0}]$

الف) $y = \sin^2 n + 3 \sin n + 2 \Rightarrow \begin{cases} -1 \leq 1 - 3 + 2 \leq 0 \\ 1 \leq 1 + 3 + 2 \leq 6 \end{cases} \Rightarrow R_y = [0, 6]$
 $\frac{-b}{2a} = \frac{-3}{2} \Rightarrow \text{نقطة}$

5

ب) $y = 2 \sin^2 n + 3 \sin n + 2 \Rightarrow \begin{cases} -1 \leq 1 \\ 1 \leq 1 \end{cases} \Rightarrow R_y = [\frac{1}{4}, 1]$
 $\frac{-b}{2a} = \frac{3}{4}$

الف) $y = \sin^2 n + 4 \cos^2 n = 1 - \cos^2 n + 4 \cos^2 n = 3 \cos^2 n + 1$
 $0 \leq \cos^2 n \leq 1 \Rightarrow 0 \leq 3 \cos^2 n \leq 3 \Rightarrow 1 \leq 3 \cos^2 n + 1 \leq 4 \Rightarrow R_y = [1, 4]$

5

ب) $y = \frac{4 \cot n}{1 + \cot n} = \frac{4 \frac{\cos n}{\sin n}}{1 + \frac{\cos n}{\sin n}} \Rightarrow 4 \cos n \sin n = \sin 2n \Rightarrow R_y = [-1, 1]$

الف) $y = \sin^4 n + \cos^4 n \Rightarrow 1 - 2 \sin^2 n + \cos^4 n \leq 1 \Rightarrow \frac{1}{4} \leq \sin^4 n + \cos^4 n \leq 1$
 $R_y = [\frac{1}{4}, 1]$

1/10

ب) $y = [\sin^4 n + \cos^4 n] \Rightarrow 1 - 2 \sin^2 n + \cos^4 n \leq 1 \Rightarrow \frac{1}{4} \leq \sin^4 n + \cos^4 n \leq 1$
 $0 \leq [\sin^4 n + \cos^4 n] \leq 1 \Rightarrow R_y = [0, 1] \quad R = \{0, 1\}$

الف) $y = \frac{2n^2 + 5n - 7}{n + 2} \cdot \frac{(n+2)(n-1)}{(n+2)} \Rightarrow$
 $\frac{2n^2 + 5n - 7}{n + 2} \cdot \frac{(n+2)(n-1)}{(n+2)} \Rightarrow R_y = \mathbb{R} - \{-1\}$

1/10

ب) $y = \frac{n^2 - 1}{n - 1} \cdot \frac{(n-1)(n^2 + n + 1)}{(n-1)} \Rightarrow n^2 + n + 1 \Rightarrow \frac{1}{4} \leq \frac{n^2 + n + 1}{n - 1} \leq 1$
 $R_y = [\frac{1}{4}, +\infty) - \{1\}$

