

$$y = \frac{n^2 + n + 1}{n - 1} \Rightarrow yn - y = n^2 + n + 1 \Rightarrow n^2 + (1 - y)n + 1 + y \quad (1)$$

(2)

$$n = \frac{-(1-y) \pm \sqrt{(1-y)^2 - 4(1+y)}}{2} = \frac{-1+y \pm \sqrt{1+y^2-2y-1-4y}}{2}$$

$$y^2 - 4y - 1 \geq 0 \Rightarrow (y-5)(y+1) \geq 0 \Rightarrow y = 5, -1$$

$$(-\infty, -1] \cup [5, +\infty) \quad \checkmark$$

$$\frac{-1}{+1} \quad \frac{5}{+}$$

$$(1) y = 2n^2 - 5n + 1 \Rightarrow \frac{-b}{2a} \Rightarrow \frac{+5}{4} \rightarrow$$

(2)

$$2\left(\frac{5}{4}\right) - 5\left(\frac{5}{4}\right) + 1 = \frac{5}{2} - \frac{25}{4} + 1 = \frac{10}{4} - \frac{25}{4} + \frac{4}{4} = \frac{-11}{4}$$

$$\min \Rightarrow \left[\frac{-11}{4}, +\infty\right) \quad \checkmark$$

$$(2) y = \sqrt{-n^2 + 4n - 5} \Rightarrow \max = \frac{-b}{2a} = \frac{-4}{-2} = 2$$

$$-9 + 18 \cdot 5 = 81$$

$$(-\infty, 5] \Rightarrow [0, 2] \quad \checkmark$$

$$(2) y = \sqrt{n^4 - 2n^2 + 1} \Rightarrow \sqrt{\mathbb{R}} = [0, +\infty)$$

$$(1) \log_{10} n^4 - 4n^2 + 17n + 2 \Rightarrow (-\infty, +\infty) \quad \checkmark$$

$$i) y = \frac{r_{n+1}}{r_{n-1}} \rightarrow \mathbb{R} - \left\{ \frac{r}{2} \right\} \Rightarrow \mathbb{R} - \left\{ \frac{r}{1} \right\} \quad (r) (r)$$

$$-) y = \sqrt{\frac{\sum_{n+1}}{n-1}} \Rightarrow \sqrt{\mathbb{R} - \{ \epsilon \}} \Rightarrow [0, +\infty) - \{ r \}$$

$$e) y = \frac{n^r + \epsilon}{\sqrt{n^r + r}} \Rightarrow \sqrt{n^r + r} + \frac{1}{\sqrt{n^r + r}} \Rightarrow n=0$$

$$\sqrt{r} + \frac{1}{\sqrt{r}} \Rightarrow \frac{\epsilon}{\sqrt{r}} \rightarrow \left[\frac{\epsilon}{\sqrt{r}}, +\infty \right)$$

$$r) y = n^r + \frac{1}{n^r + \epsilon} \Rightarrow n^r + \epsilon + \frac{1}{n^r + \epsilon} - \epsilon \rightarrow n=0$$

$$\left[\frac{1}{\epsilon}, +\infty \right) \checkmark$$

$$y = \frac{r_{n+1} + \epsilon}{n^r - 1} \begin{cases} n=0 \rightarrow y = -\epsilon \\ n=\infty \Rightarrow y = r \end{cases} \quad (r) (r)$$

$$(-\infty, -\epsilon] \cup (r, +\infty) \checkmark$$

$$y = \frac{r_n^2 + \varepsilon}{n^2 - 1} \Rightarrow y n^2 - y = r_n^2 + \varepsilon \Rightarrow y n^2 - r_n^2 = \varepsilon + y$$

$$\Rightarrow n^2(y - r) = \varepsilon + y \Rightarrow n^2 = \frac{r + y}{y - r} \Rightarrow n = \sqrt{\frac{\varepsilon + y}{y - r}}$$

$$\underbrace{+ \quad - \quad +}_{- \varepsilon \quad r} \quad (-\infty, -\varepsilon] \cup (r, +\infty) \quad \checkmark$$

$$y = \frac{r \sin n - 1}{\sin n + r} \Rightarrow y \sin n + r y = r \sin n - 1$$

$$(y - r) \sin n = -1 - r y$$

$$\sin n = \frac{-1 - r y}{y - r} \Rightarrow -1 < \frac{1 + r y}{r - y} \leq 1$$

$\left[-\frac{r}{r}, r \right]$
 $\frac{-1 - r y}{r - y}$

$$0 < \frac{1 + r y}{r - y} + 1 \Rightarrow 0 < \frac{1 + r y + r - y}{r - y} = \frac{r + r y}{r - y} > 0$$

MRNOTE

$$\frac{1+\kappa y}{r-y} \leq 1 \Rightarrow \frac{1+\kappa y}{r-y} - 1 \leq 0 \Rightarrow \frac{1+\kappa y - r + y}{r-y} \leq 0$$

$$\frac{-1+\kappa y}{r-y} \leq 0 \quad \frac{\frac{1}{\varepsilon} r}{1 + \frac{1}{\varepsilon} r} \quad (-\infty, \frac{1}{\varepsilon}] \cup (r, +\infty)$$

$$\textcircled{1}, \textcircled{2} \left[-\frac{\kappa}{r}, \frac{1}{\varepsilon} \right] \checkmark$$

$\textcircled{2} \textcircled{0},$

$$\left. \begin{array}{l} n=-1 \rightarrow \frac{-r-1}{-1+\kappa} = -\frac{\kappa}{r} \\ n=+1 \rightarrow \frac{r-1}{1+\kappa} = \frac{1}{\varepsilon} \end{array} \right\} \Rightarrow \left[-\frac{\kappa}{r}, \frac{1}{\varepsilon} \right] \checkmark$$

$$f(n) = \frac{n^2 - n + \frac{1}{2}}{n^2 - n + 1} \Rightarrow n^2 - n + 1 \neq 0$$

هواره برقرار (4)

(Pv1)

$$D_f = \mathbb{R}$$

بر روی

$$yn^2 - yn + y = n^2 - n + \frac{1}{2} \Rightarrow (1-y)n^2 + (y-1)n + \frac{1}{2} - y$$

$$n = \frac{-y+1 \pm \sqrt{(y-1)^2 - 4(\frac{1}{2}-y)(1-y)}}{2-2y} \Rightarrow y^2 + 1 - 2y - 1 + 2y - 2y^2$$

$$-y^2 + 2y \geq 0$$

$$-y^2 + y \geq 0$$

$$= \frac{1}{1+1} = \frac{1}{2}$$

MRNOTE

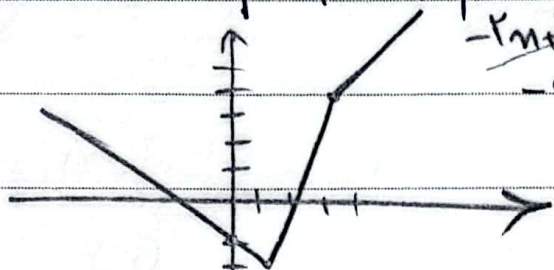
$$1-2y \neq 0 \Rightarrow 1 \neq 2y$$

$$y \neq \frac{1}{2}$$

$$[0, 1]$$

$$\hookrightarrow Ry = [0, 1)$$

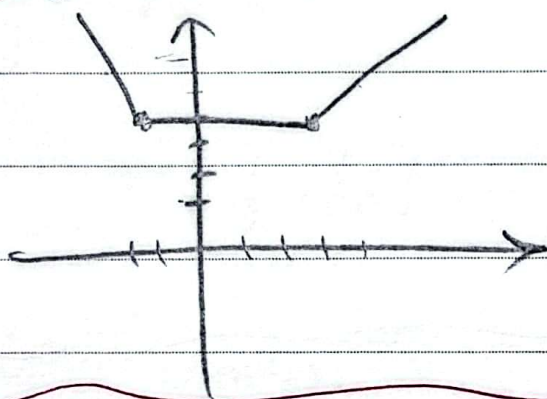
i) $y = |2n-2| - |n-3|$



$-2n+4+n-3$	$2n-2+n-3$	$2n-2-n+3$
$-n+1$	$3n-5$	$n+1$
$\ominus$	Σ	$\oplus$

$[-2, +\infty)$

ii) $y = |n-3| + |n+1|$



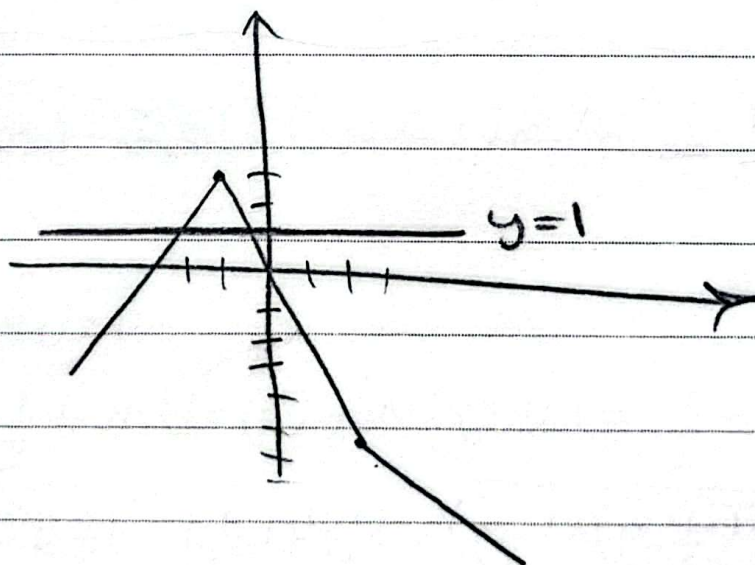
$-n+3-n-1$	$-n+3+n+1$	$n-3+n+1$
$-2n+2$	4	$2n-2$
Σ	Σ	Σ

$[4, +\infty)$

$|n-2| - |n+2| \leq 1$

$\ominus \oplus$

$n+2+n+2$	$-n+2-n-2$	$n-2-n-2$
$3n+4$	$-2n$	$-3n-4$
$\oplus$	$\ominus$	$\ominus$



$(-\infty, -3] \cup [-1, +\infty)$

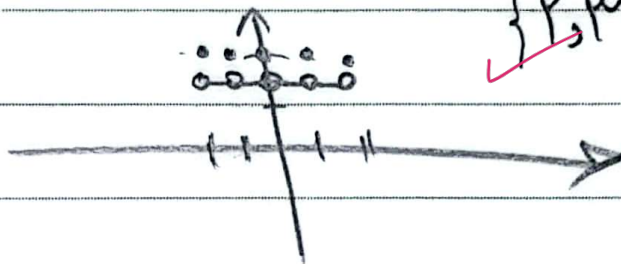
$$iv) y = [n] + [k-n]$$

$$[-r, r]$$

(9)

$$y = [n] + [-n] + k$$

$$\begin{cases} n \in \mathbb{Z} & k \\ n \in \mathbb{R} - \mathbb{Z} & r \end{cases}$$



$$\{r, k\}$$

(10)

$$-r) y = k - [n]$$

$$-r \leq n < -1 \Rightarrow [-r] = [n]$$

$$k - (-r) + r = -\varepsilon$$

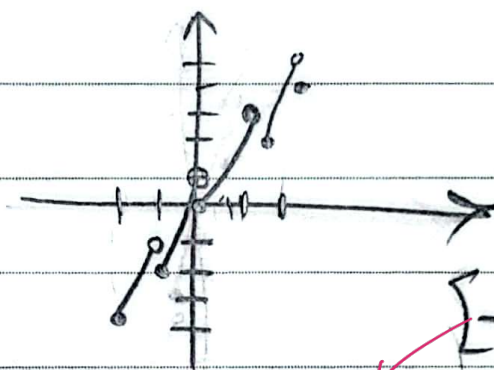
$$k - r + r = -1$$

$$-1 \leq n < 0 \Rightarrow [-1] = [n]$$

$$-1 \times k + 1 = -r$$

$$k + 1 = 1$$

$$r \times k - r = \varepsilon$$



$$[-\varepsilon, \infty)$$

$$[0] = [n]$$

$$0 \leq n < 1 \Rightarrow 0 \times k - 0 = 0$$

$$1 \times k - 0 = k$$

$$1 \leq n < 2 \Rightarrow 1 \times k - 1 = +r$$

$$[1] = [n] = 1 \quad r \times k - 1 = \infty$$

$$iv) y = \sin k - \sin n + 1$$

$$\sin n = 1$$

$$1 - 1 + 1 = 1$$

$$\sin n = -1$$

$$1 + 1 + 1 = k$$

$$\frac{-b}{r_a} = \frac{1}{r}$$

$$\frac{1}{\varepsilon} - \frac{1}{r} + 1 = \frac{k}{\varepsilon}$$

$$[\frac{k}{\varepsilon}, k]$$

(11)

(12)

$$-r) \sin^{\varepsilon} n + \sin^r n + 1$$

$$\sin^{\varepsilon} n = 1$$

$$1 + 1 + 1 = k$$

$$\frac{-b}{r_a} = \frac{1}{r}$$

$$\sin^r n = 0$$

$$1 + 0 + 0 = 1$$

$$[1, k]$$