

1) الف) $y = \frac{u+v}{v^3+3u^2-1u+v} \rightarrow y = \frac{1}{\Sigma} \rightarrow \Sigma \neq 0 \rightarrow v^3+3u^2-1u+v \rightarrow$ مجموع ضرایب

$$\begin{array}{r} v^3+3u^2-1u+v \mid (u-1) \rightarrow 1 \\ -v^3+3u^2 \\ \hline 3u^2-1u \\ -3u^2+3u \\ \hline -u-v \end{array} \quad \begin{array}{l} (u-1) \rightarrow 1 \\ v^3+3u^2-1u+v \rightarrow (u+u)(u-1) \left\{ \begin{array}{l} \frac{1}{v} \\ -\frac{1}{u} \end{array} \right. \end{array}$$

 $D_f: \mathbb{R} - \{ \frac{1}{v}, -\frac{1}{u} \}$

ب) $y = \frac{u+v}{v^3+9u^2+1 \cdot u+v} \rightarrow y = \frac{1}{\Sigma} \rightarrow \Sigma \neq 0 \rightarrow v^3+9u^2+1 \cdot u+v \neq 0 \rightarrow$ مجموع ضرایب

$$\begin{array}{r} v^3+9u^2+1 \cdot u+v \mid (u+1) \rightarrow -1 \\ -v^3+9u^2+u \\ \hline 10u^2+u+v \\ -10u^2-10u \\ \hline 11u+v \end{array} \quad \begin{array}{l} (u+1) \rightarrow -1 \\ v^3+9u^2+1 \cdot u+v \rightarrow (u+1)(u+u) \left\{ \begin{array}{l} u = -v \\ u = -\frac{1}{v} \end{array} \right. \end{array}$$

 $D_f: \mathbb{R} - \{ -v, -\frac{1}{v} \}$

2) الف) $y = \frac{u+v}{u^3-vu^2+vu-1} \rightarrow y = \frac{1}{\Sigma} \rightarrow \Sigma \neq 0 \rightarrow u^3-vu^2+vu-1 \neq 0 \rightarrow$ مجموع ضرایب

$$\begin{array}{r} u^3-vu^2+vu-1 \mid (u-1) \rightarrow 1 \\ -u^3+u^2 \\ \hline u^2+vu-1 \\ -u^2+u \\ \hline vu-u-1 \end{array} \quad \begin{array}{l} (u-1) \rightarrow 1 \\ u^3-vu^2+vu-1 \rightarrow \Delta < 0 \end{array}$$

 $D_f: \mathbb{R} - \{1\}$

ب) $y = \sqrt{\frac{u+v}{u^3-vu^2+vu-1}} > 0 \quad \frac{u+v}{(u^3-vu^2+vu-1)} > 0 \quad \frac{(-\infty - \infty) \cup (1 + \infty)}{+ \frac{1}{-1} - \frac{1}{1} + 1}$

3) $y = \frac{1}{\Sigma} \rightarrow \Sigma \neq 0 \rightarrow u^3-6(u-1)-vu+6 \neq 0 \rightarrow$

$$\begin{array}{r} u^3-6u+6 \mid u^3-6u+1 \\ \hline 5 \end{array} \quad \begin{array}{l} u^3-6u+6 \rightarrow (u-5)(u-1) \left\{ \begin{array}{l} u \neq 5 \\ u \neq 1 \end{array} \right. \end{array}$$

 $\rightarrow u^3+vu \neq 0 \rightarrow u(u+6) \neq 0 \rightarrow u \neq 0, u \neq -6$
 $\rightarrow u^3-6u+6 \rightarrow \Delta < 0$

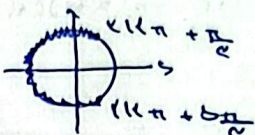
4) الف) $y = \sqrt{[u]-2} \rightarrow [u]-2 > 0 \rightarrow [u] > 2 \rightarrow (-\infty - \infty)$
 ب) $y = \frac{6u^2+4}{[u]^2-2[u]-2} = f' - 1 f - 2 = 0 \quad (f-2)(f+1) \left\{ \begin{array}{l} f=1 \rightarrow [u] = -1 \\ f=2 \rightarrow [u] = 2 \end{array} \right.$
 $R = ([-1, 0) \cup [2, \infty))$

5) $y = \sqrt{[u - \frac{1}{2}] + [u + \frac{1}{2}]} > 0 \rightarrow [u + \frac{1}{2}] > 1 \rightarrow [u + \frac{1}{2}] > \frac{1}{2} = [u + \frac{1}{2}] > 1$
 $u + \frac{1}{2} > 1 \rightarrow u > \frac{1}{2}$
 $y = \sqrt{[u - \frac{1}{2}] + [\frac{1}{2} - u]} \rightarrow [a] + [-a] > 0 \rightarrow a \in \mathbb{Z} \rightarrow [a] + [-a] = -1$
 $a \in \mathbb{Z} \rightarrow [a] - [a] = 0 \checkmark \rightarrow u - \frac{1}{2} \in \mathbb{Z}$
 $D_f: \{ u \mid u = k + \frac{1}{2}, k \in \mathbb{Z} \}$

$$④ \text{ ا) } y = \frac{\cot u + 1}{\tan u + 1} \quad \left\{ \begin{array}{l} \text{① } \tan u + 1 \rightarrow u \neq \frac{\pi}{2} \text{ و } \frac{3\pi}{2} \\ \text{② } \sin u \neq 0 \rightarrow u \neq 0 \text{ و } \pi \\ \text{③ } \cos u \neq 0 \rightarrow u \neq \frac{\pi}{2} \text{ و } \frac{3\pi}{2} \end{array} \right\} \text{ د.ف: } \mathbb{R} - \left\{ \frac{k\pi}{r}, k\pi - \frac{\pi}{2} \right\}$$

$$\text{ب) } 1 - \sin u \rightarrow \sin u \leq \frac{1}{2} \rightarrow -\frac{1}{2} \leq \sin u \leq \frac{1}{2} \rightarrow \text{د.ف: } \left[k\pi - \frac{\pi}{4}, k\pi + \frac{\pi}{4} \right]$$

$$⑤ \text{ ا) } y = \sqrt{r \sin u - 1} \rightarrow r \sin u - 1 \geq 0 \rightarrow \sin u \geq \frac{1}{r} \rightarrow \text{د.ف: } \left[k\pi + \frac{\pi}{6}, k\pi + \frac{5\pi}{6} \right]$$

$$\text{ب) } y = \sqrt{1 - r \cos u} \rightarrow 1 - r \cos u \geq 0 \rightarrow \cos u \leq \frac{1}{r} \rightarrow \text{د.ف: } \left[k\pi + \frac{\pi}{2}, k\pi + \frac{3\pi}{2} \right]$$


$$\text{① } y = 4r \sin(u^r + \psi u + 1) \rightarrow -1 \leq u^r + \psi u + 1 \leq 1 \rightarrow \begin{array}{l} u^r + \psi u + 1 \leq 1 \rightarrow \frac{-r}{r^2 - \psi^2} \leq u \leq \frac{-r}{r^2 - \psi^2} \\ u^r + \psi u + 1 \geq -1 \rightarrow \frac{-r}{r^2 - \psi^2} \leq u \leq \frac{-r}{r^2 - \psi^2} \end{array}$$

$$\text{د.ف: } [-r^2 - r] \cup [-1, 0]$$

$$\text{ب) } \cos y = \sqrt{b - ru} \rightarrow \begin{array}{l} \text{① } b - ru \geq 0 \rightarrow u \leq \frac{b}{r} \\ \text{② } -1 \leq \sqrt{b - ru} \leq 1 \rightarrow \begin{cases} \text{③ } b - ru \leq 1 \rightarrow u \geq \frac{b-1}{r} \\ \text{④ } b - ru \geq -1 \rightarrow u \leq \frac{b+1}{r} \end{cases} \end{array} \xrightarrow{\text{ب) }} \text{د.ف: } \left[\frac{b-1}{r}, \frac{b}{r} \right]$$

$$\text{① } y = \log_r \left(\frac{1 - \log_r u}{1 - \log_r \frac{1}{r}} \right) \rightarrow \begin{array}{l} \text{I) } u > 0 \\ \text{II) } 1 - \log_r u > 0 \rightarrow \log_r u < 1 \rightarrow u < r \end{array} \} \sim \text{د.ف: } (0, r)$$

$$y = \log_r \left(\frac{1 - \log_r \frac{1}{r}}{1 - \log_r \frac{1}{r}} \right) \rightarrow \begin{array}{l} u > 0 \\ 1 - \log_r \frac{1}{r} > 0 \rightarrow \log_r \frac{1}{r} < 1 \rightarrow u > \frac{1}{r} \end{array} \} \sim \text{د.ف: } \left(\frac{1}{r}, +\infty \right)$$

$$\text{② } y = \sqrt{r^{2u - ru} - 1} \rightarrow \begin{array}{l} r^{2u - ru} - 1 \geq 0 \rightarrow r^{2u - ru} \geq 1 \rightarrow \begin{array}{l} 2u - ru \geq 0 \rightarrow u \geq 0 \\ 2u - ru \leq 0 \rightarrow u \leq 0 \end{array} \end{array} \rightarrow \text{د.ف: } [0, 0]$$

$$\text{ب) } y = \left(\frac{u + \psi}{ru + \psi} \right)^{\frac{1}{r}} \rightarrow \frac{u + \psi}{ru + \psi} \in \mathbb{R} \rightarrow \text{د.ف: } \{u \mid u = \frac{-\psi + \sqrt{\psi^2 - r\psi}}{r - \psi}, k \in \mathbb{N}\}$$