

پاسخ

الف) $y = \sqrt{\frac{n^2-4n}{n^3-n}} \Rightarrow \frac{n^2-4n}{n^3-n} \geq 0 \Rightarrow \frac{n(n-4)}{n(n^2-1)} \geq 0 \Rightarrow \frac{n(n-4)}{n(n-1)(n+1)} \geq 0$

ب) $\frac{n^4-n^3}{n^3-n} \geq 0 \Rightarrow \frac{n^3(n-1)}{n(n^2-1)} \geq 0 \Rightarrow \frac{n^2(n-1)(n+1)}{n(n-1)(n+1)} \geq 0$

$P_f = \mathbb{R} - \{\pm 1, 0\}$

الف) $n+|n| \geq 0 \Rightarrow \begin{matrix} n \geq 0 \rightarrow \checkmark \\ n < 0 \rightarrow \times \\ 0 \rightarrow \times \end{matrix} \quad P_f = (0, +\infty)$

ب) $n/|n| \geq 0 \Rightarrow \begin{matrix} n \geq 0 \rightarrow \checkmark \\ n < 0 \rightarrow \times \\ 0 \rightarrow \times \end{matrix} \quad P_f = (0, +\infty)$

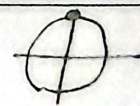
الف) $x \in [a] \Rightarrow x \geq a \Rightarrow P_f = (-\infty, a]$

ب) $x \in [a] \Rightarrow x \leq a \Rightarrow P_f = (-\infty, a]$

الف) $\left[x - \frac{1}{x}\right] + \left[x + \frac{2}{x}\right] \geq 0 \xrightarrow{+1} \left[x - \frac{1}{x} + 1\right] + \left[x + \frac{2}{x}\right] \geq 1 \rightarrow \left[x + \frac{2}{x}\right] + \left[x + \frac{1}{x}\right] \geq 1$

ب) $\left[x - \frac{1}{x}\right] + \left[-x + \frac{1}{x}\right] \geq 0 \rightarrow \left[x - \frac{1}{x}\right] + \left[-\left(x - \frac{1}{x}\right)\right] \geq 0 \xrightarrow{\text{if}} \begin{cases} a \in \mathbb{Z} & [a] + [-a] = 0 \\ a \notin \mathbb{Z} & [a] + [-a] = -1 \end{cases}$

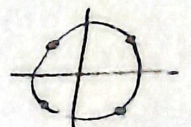
الف) $\sin x - 1 \neq 0 \Rightarrow \sin x \neq 1 \Rightarrow P_f = \mathbb{R} - \left\{2k\pi + \frac{\pi}{2}\right\}$



ب) $2\sin^2 x - 1 \neq 0 \Rightarrow 2\sin^2 x \neq 1 \Rightarrow \sin^2 x \neq \frac{1}{2} \Rightarrow \sin x \neq \pm \frac{1}{\sqrt{2}}$

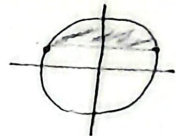
$P_f = \mathbb{R} - \left\{\frac{k\pi}{2} + \frac{\pi}{4}\right\}$

$= \pm \frac{\sqrt{2}}{2}$



الف) $r \sin n - 1 \gg 0 \Rightarrow r \sin n \gg 1 \Rightarrow \sin n \gg \frac{1}{r}$

$D_f = \mathbb{R} - \left[r k \pi + \frac{\pi}{2}, r k \pi + \frac{3\pi}{2} \right]$

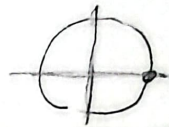


6

ب) $\cos n - 1 \gg 0 \Rightarrow \cos n \gg 1$

$D_f = \{ r k \pi \}$

Ⓟ ✓



عبارات متقابل الف
من $[-1, 1]$ من $[-1, 1]$

$\Rightarrow \frac{1}{|n|} - 3 \ll 1 \Rightarrow \frac{1}{|n|} \ll 4 \Rightarrow \frac{1}{|n|} \ll \frac{1}{\varepsilon} \Rightarrow |n| \gg \frac{1}{\varepsilon}$

$D_f = [-\varepsilon, -2] \cup [2, \varepsilon]$

Ⓟ ✓

ب) $-1 \ll n^2 + 3n + 1 \ll 1 \Rightarrow \begin{cases} n^2 + 3n + 1 \ll 1 \rightarrow n^2 + 3n \ll 0 \Rightarrow n(n+3) \ll 0 \\ n^2 + 3n + 1 \gg -1 \rightarrow n^2 + 3n \gg -2 \Rightarrow (n+1)(n+2) \gg 0 \end{cases}$

$D_f = [-5, -2] \cup [-1, 0]$

7

الف) $r - \log_r(n-2) \gg 0 \Rightarrow r \gg \log_r(n-2) \Rightarrow r \gg n-2 \Rightarrow |n| \gg r$

$D_f = (r, \infty)$

8

ب) $\log(n^2 - n) \gg 0 \Rightarrow n^2 - n \gg 0 \Rightarrow n(n-1) \gg 0 \Rightarrow n(n+1)(n-1) \gg 0$

$D_f = (-1, 0) \cup (1, \infty)$

Ⓟ ✓

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

الف) $\varepsilon^{n+1} \neq 0 \Rightarrow \varepsilon^n \neq -1$

$\Rightarrow D_f = \mathbb{R}$

ب) $\varepsilon^n - 1 \neq 0 \Rightarrow \varepsilon^n \neq 1 \Rightarrow n \neq 0 \Rightarrow D_f = \mathbb{R} - \{0\}$

2) $\varepsilon^n - 2 \neq 0 \Rightarrow \varepsilon^n \neq 2 \Rightarrow n \neq \log_\varepsilon 2 \Rightarrow D_f = \mathbb{R} - \log_\varepsilon 2$

3) $\varepsilon^n - 3 \neq 0 \Rightarrow \varepsilon^n \neq 3 \Rightarrow n \neq \log_\varepsilon 3 \Rightarrow D_f = \mathbb{R} - \log_\varepsilon 3$

9

الف) $\varepsilon_{n+1} \in W \Rightarrow \varepsilon_n \in W-1 \Rightarrow n \in \frac{W-1}{\varepsilon} \Rightarrow D_f = \{ n \mid n = \frac{k-1}{\varepsilon}, k \in W \}$

ب) $\left(\frac{r_n - r}{r_n - d} \right) \in W \Rightarrow \frac{r_n - r}{r_n - d} \in W \Rightarrow r_n - r = (r_n - d)w \Rightarrow r_n - r = r_n w - d w \Rightarrow r_n(1-w) = r - d w$

$D_f = \{ n \mid n = \frac{r-dk}{r-rk}, k \in W \}$

$n = \frac{r-dw}{r-rw}$

Ⓟ ✓