

الف) $\frac{x(x^4-4)}{x(x-1)(x+1)} = \frac{-1}{x} + \frac{1}{x-1} + \frac{1}{x+1} + \frac{6}{x} \quad D_f = (-1, 0) \cup (0, 1) \cup (1, +\infty)$

ب) $\frac{x^3(x-1)(x+1)}{x(x-1)(x+1)} = \frac{-1}{x} + \frac{1}{x-1} + \frac{1}{x+1} + \frac{1}{x} \quad D_f = (-\infty, -1) \cup (-1, 0) \cup (0, 1) \cup (1, +\infty)$

الف) $x+|x| > 0 \rightarrow |x| > -x \rightarrow D_f = \mathbb{R}^+$

$\ominus \alpha$
 $\oplus \checkmark$
 $\ominus \alpha$

ب) $x|x| > 0 \rightarrow D_f = \mathbb{R}^+$

$\ominus \alpha$
 $\ominus \alpha$
 $\oplus \checkmark$

الف) $2-[x] \geq 0 \rightarrow 2 \geq [x] \rightarrow D_f = (-\infty, 2)$

ب) $2-[x] > 0 \rightarrow 2 > [x] \rightarrow D_f = (-\infty, 2)$

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

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بعد از $\frac{1}{x}$ است

ب) $\left[x - \frac{1}{x} \right] + \left[-x + \frac{1}{x} \right] \geq 0 \quad \begin{cases} a \in \mathbb{Z} & [a] + [-a] = 0 \\ a \notin \mathbb{Z} & [a] + [-a] = -1 \end{cases} \quad \begin{matrix} x - \frac{1}{x} \in \mathbb{Z} \\ x \in \mathbb{Z} + \frac{1}{x} \end{matrix}$

$D_f = \left\{ x \mid x = k + \frac{1}{x}, k \in \mathbb{Z} \right\}$

الف) $\sin x - 1 \neq 0$
 $\sin x \neq 1$



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

ب) $\sqrt{\sin^2 x} - 1 \neq 0$

$\sqrt{\sin^2 x} \neq 1$

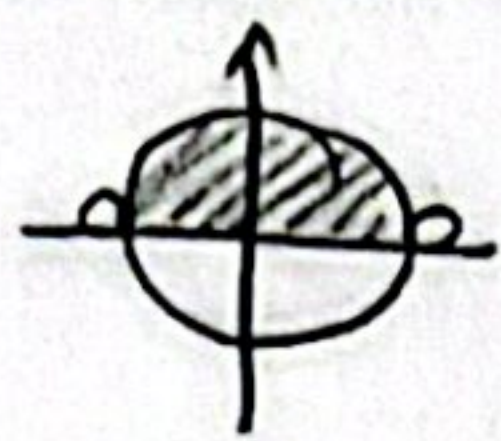
$\sin^2 x \neq \frac{1}{r} \rightarrow \sin x \neq \pm \sqrt{\frac{1}{r}} \rightarrow \sin x \neq \pm \frac{\sqrt{r}}{r}$



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

الف) $r \sin x - 1 \geq 0$

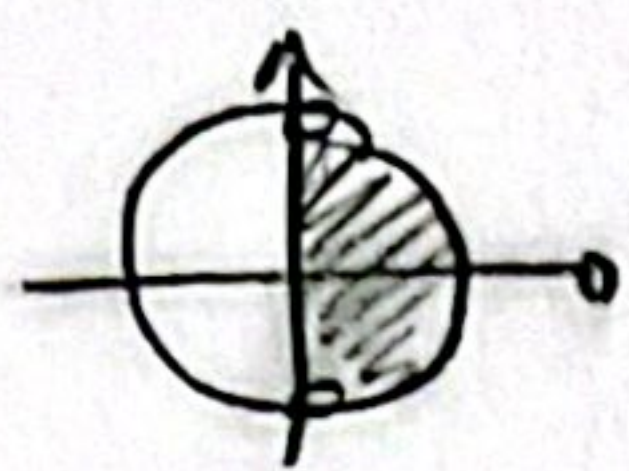
$r \sin x \geq 1 \rightarrow \sin x \geq \frac{1}{r}$



$D_f = (r\pi, r\pi + \pi)$

ب) $\cos x - 1 \geq 0$

$\cos x \geq 1$



$D_f = (r\pi + \frac{\pi}{r}, r\pi - \frac{\pi}{r})$

الف) $|n| - r \leq 0 \rightarrow -1 \leq |n| - r \leq 1 \rightarrow r \leq |n| \leq r+1$

$D_f = [-r, -r+1] \cup [r, r+1]$

$-r \geq n \geq -r+1$
 $r \leq n \leq r+1$

ب) $-1 \leq n^2 + r \leq 1 \rightarrow -1 \leq n^2 + r \leq 1 \rightarrow n^2 + r \geq 0$
 $(n+1)(n+r)$

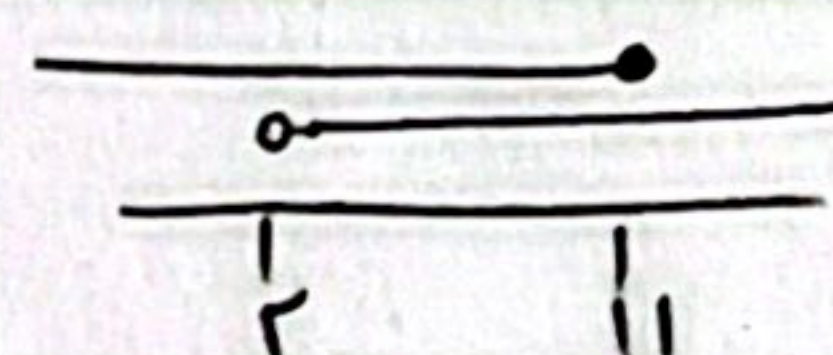
$\frac{-r}{+} - \frac{-1}{+} \quad \textcircled{1}$

$n^2 + r \leq 1 \rightarrow n^2 + r \leq 0 \rightarrow n(n+r) \leq 0$
 $\frac{-r}{+} - \frac{0}{+} \quad \textcircled{2}$

$\textcircled{1} \cup \textcircled{2} = [-r, -r+1] \cup [r, r+1]$

الف) $n - r > 0 \rightarrow n > r$

$r - \log_r^{n-r} \geq 0 \rightarrow r \geq \log_r^{n-r} \rightarrow n - r \leq 1 \rightarrow n \leq r+1$



$D_f = (r, r+1]$

ب) $n^2 - n > 0$

$n(n-1)(n+1) > 0$

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

$D_f = [-1, 0] \cup [1, +\infty)$

الف) $\varepsilon^n + 1 \neq 0 \rightarrow \varepsilon^n \neq -1 \rightarrow D_f \in \mathbb{R}$

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

ج) $\varepsilon^n - r \neq 0 \rightarrow \varepsilon^n \neq r \rightarrow n \neq \log_r^r \rightarrow D_f = \mathbb{R} - \{\log_r^r\}$

د) $\varepsilon^n - r \neq 0 \rightarrow \varepsilon^n \neq r \rightarrow n \neq \log_r^r \rightarrow D_f = \mathbb{R} - \{\log_r^r\}$

الف) $\varepsilon_{n+1} \in \omega \rightarrow \varepsilon_n \in \omega - 1 \rightarrow n \in \frac{\omega-1}{\varepsilon}$

$D_f = \{n \mid n = \frac{k-1}{\varepsilon}, k \in \omega\}$

ب) $\frac{r^n - r}{r^n - \Delta} \in \omega \rightarrow r^n - r \in r^n \omega - \Delta \omega$

$-r^n \omega + r^n \in r - \Delta \omega$

$n(r - r\omega) \in r - \Delta \omega \rightarrow n \in \frac{r - \Delta \omega}{r - r\omega}$

$D_f = \{n \mid n = \frac{r - \Delta k}{r - rk}, k \in \omega\}$