

الف) $2x^3 + 3x^2 - 11x + 3 \div (x-1) = 2x^2 + 5x - 3$ $(x+3) \rightarrow (-3)$
 $D_f = \mathbb{R} - \left\{ -\frac{3}{2}, 1, \frac{1}{2} \right\}$ $\frac{(x+3)(x-1)(x-1)}{(x-1)}$
 $\frac{-3}{2} \rightarrow (-3)$ $\frac{1}{2} \rightarrow (-1)$

ب) $2x^3 + 9x^2 + 10x + 3 \div (x+1) = 2x^2 + 7x + 3$ $(x+3) \rightarrow (-3)$
 $D_f = \mathbb{R} - \left\{ -\frac{3}{2}, -\frac{1}{2}, -1 \right\}$ $\frac{(x+3)(x+1)(x+1)}{(x+1)}$
 $\frac{-3}{2} \rightarrow (-3)$ $\frac{-1}{2} \rightarrow (-1)$

الف) $2x^2 - 2x^2 + 2x - 1 \div (x-1) = 2x - 1 \rightarrow \Delta < 0$ $(x+3)$
 $D_f = \mathbb{R} - \{1\}$ $\frac{(x-1)(2x^2 - 2x + 1)}{\Delta < 0}$

ب) $\frac{2x^3 + 3x^2 + 2x - 1}{(x-1)(2x^2 - 2x + 1)} \geq 0$ $\frac{-3}{+} - \frac{1}{+} + \Rightarrow D_f = (-\infty, -3] \cup (1, +\infty)$

$2x^2 - \Delta |x-1| - 2x + \Delta \neq 0$
 $|x| \geq 1 \Rightarrow 2x^2 - \Delta x + \Delta - 2x + \Delta = 2x^2 - 4x + 2\Delta = (x-2)(x-\Delta) \neq 0$
 $|x| \leq 1 \Rightarrow 2x^2 - \Delta + \Delta x - 2x + \Delta \neq 0$ $2x^2 + 3x \neq 0$ $x(x+3) \neq 0$
 $\Rightarrow D_f = \mathbb{R} - \{2, \Delta, 0, -3\}$

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

ب) $([x] - 3)([x] + 1) \neq 0$
 $[x] \neq -1 \Rightarrow [-1, 0)$
 $[x] \neq 3 \Rightarrow x \notin [3, 4)$
 $D_f = \mathbb{R} - [-1, 0) \cup [3, 4)$

الف) $[x - \frac{1}{x}] + [x + \frac{x}{x}] \geq 0$ $[x - \frac{1}{x} + 1 - 1] + [x + \frac{x}{x}] \geq 0$
 $[x + \frac{x}{x}] - 1 + [x + \frac{x}{x}] \geq 0$ $2[x + \frac{x}{x}] \geq 1$ $[x + \frac{x}{x}] \geq \frac{1}{2}$
 $x + \frac{x}{x} \geq 1$ $x \geq \frac{1}{x} \Rightarrow D_f = [\frac{1}{x}, +\infty)$

ب) $[x - \frac{1}{x}] + [-(x - \frac{1}{x})] \geq 0$ $[a] + [-a] \geq 0 \rightarrow a \in \mathbb{Z} \Rightarrow \odot \checkmark$
 $x - \frac{1}{x} \in \mathbb{Z} \Rightarrow D_f = \{x | x = k + \frac{1}{x}, k \in \mathbb{Z}\}$ $a \notin \mathbb{Z} \Rightarrow \ominus \times$

الف) $\tan n \neq -1$  $D_f = \mathbb{R} - \left\{ \frac{K\pi}{r}, K\pi - \frac{\pi}{r} \right\}$

ب) $1 - r \sin^2 n \geq 0 \quad \frac{1}{r} \geq \sin^2 n \quad -\frac{1}{r} \leq \sin n \leq \frac{1}{r}$
 $D_f = \left[K\pi - \frac{\pi}{r}, K\pi + \frac{\pi}{r} \right]$

الف) $r \sin n - 1 \geq 0 \quad r \sin n \geq 1 \quad \sin n \geq \frac{1}{r}$ 
 $D_f = \left[rK\pi + \frac{\pi}{r}, rK\pi + \frac{\pi}{r} \right]$

ب) $1 - r \cos n \geq 0 \quad 1 \geq r \cos n \quad \frac{1}{r} \geq \cos n$ 
 $\mathbb{R} - \left\{ rK\pi - \frac{\pi}{r}, rK\pi + \frac{\pi}{r} \right\}$

الف) $-1 \leq n^r + rn + 1 \leq 1$ $\textcircled{1} \quad \textcircled{2} \quad n^r + rn \leq 0$
 $\textcircled{1} \quad n^r + rn + 1 \geq 0 \rightarrow -1 \leq \frac{-r-1}{r+1} \rightarrow -r \leq \frac{-r-1}{r+1} \rightarrow \textcircled{2} \Rightarrow D_f = [-r, r] \cup [-1, 0]$

ب) $-1 \leq \sqrt{a - rn} \leq 1 \Rightarrow D_f = [r, +\infty)$
 $a - rn \leq 1 \quad r \leq rn \quad \boxed{r \leq n}$

الف) $\boxed{n > 0} \quad 1 - \log \frac{n}{r} > 0 \quad \log \frac{n}{r} < 1 \quad \boxed{n < r} \quad D_f = (0, r)$

ب) $\boxed{n > 0} \quad 1 - \log \frac{n}{r} > 0 \quad 1 + \log \frac{n}{r} > 0 \quad \log \frac{n}{r} > -1$
 $n > r^{-1} \Rightarrow \boxed{n > \frac{1}{r}} \quad D_f = \left(\frac{1}{r}, +\infty \right)$

الف) $r^{fn-2r} - 1 \geq 0 \quad r^{fn-2r} \geq r^r \Rightarrow fn-2r \geq r$
 $n^r - fn + r \leq 0 \quad (n-r)(n-1) \leq 0 \quad D_f = [1, r]$

ب) $\frac{rn+d}{rn+r} \in W \quad n = -\frac{rw-d}{rw-r} \Rightarrow n = \frac{d-rk}{rk-r}$
 $D_f = \left\{ n \mid n = \frac{d-rk}{rk-r}, k \in W \right\}$