

الف) $\frac{2x^3 + 3x^2 - 11x + 3}{-2x^3 - 2x^2} \cdot \frac{x-1}{2x^2 + 5x - 3} \Rightarrow (x+3)(2x-1)$

ب) $\frac{2x^3 + 9x^2 + 6x + 3}{-2x^3 - 2x^2} \cdot \frac{x+1}{2x^2 + 7x + 3} = (2x+1)(x+3)$

$(2x+1)(x+3)(x+1) \neq 0 \Rightarrow x \neq -\frac{1}{2}, -1, -\frac{1}{3}$

$\Rightarrow D_f = \mathbb{R} - \left\{-\frac{1}{2}, -1, -\frac{1}{3}\right\}$

$(x-1)(x+3)(2x-1) \neq 0 \Rightarrow x \neq 1, -\frac{1}{2}, \frac{1}{2} \Rightarrow D_f = \mathbb{R} - \left\{-\frac{1}{2}, \frac{1}{2}, 1\right\}$

الف) $\frac{x^2 - 2x^2 + 2x - 1}{-x^2 - x^2} \cdot \frac{x-1}{x^2 - x + 1} \Rightarrow \Delta < 0$

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

$\Rightarrow D_f = (-\infty, -3] \cup (1, +\infty)$

$(x-1)(x^2 - x + 1) \neq 0 \Rightarrow x \neq 1 \Rightarrow D_f = \mathbb{R} - \{1\}$

$x^2 - 2|x-1| - 2x + 6 \geq 0$

$x-1 > 0 \Rightarrow x^2 - 2x + 4 \geq 0 \Rightarrow x \neq 2, 0$

$x-1 < 0 \Rightarrow x^2 + 2x \geq 0 \Rightarrow x \neq -2, 0$

$\Rightarrow D_f = \mathbb{R} - \{-2, 0, 2\}$

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

ب) $[x] - 2[x] - 2 \neq 0 \xrightarrow{[x]=t} t^2 - 2t - 2 \neq 0 \Rightarrow t \neq -1, 3 \Rightarrow \begin{cases} [x] \neq -1 \Rightarrow x \notin [-1, 0) \textcircled{I} \\ [x] \neq 3 \Rightarrow x \notin [3, 4) \textcircled{II} \end{cases}$

$\textcircled{I} \cup \textcircled{II} \Rightarrow D_f = (-\infty, -1) \cup [0, 3) \cup [4, +\infty)$

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

$\Rightarrow x \geq \frac{1}{x} \Rightarrow D_f = \left[\frac{1}{x}, +\infty\right)$

ب) $\left[x - \frac{1}{x}\right] + \left[\frac{1}{x} - x\right] \geq 0 \Rightarrow \frac{1}{x} - \frac{1}{x} \geq 0 \Rightarrow x = \frac{1}{x} \Rightarrow D_f = \left\{\frac{1}{x}\right\}$

$\text{الف) } \cot x = \frac{\cos x}{\sin x} \Rightarrow \sin x \neq 0 \Rightarrow x \neq 0, \pi \Rightarrow x \neq \{k\pi\} \text{ ①}$ $\tan x = \frac{\sin x}{\cos x} \Rightarrow \cos x \neq 0 \Rightarrow x \neq \frac{\pi}{2}, \frac{3\pi}{2} \Rightarrow x \neq \{k\pi + \frac{\pi}{2}\} \text{ ②}$ $\tan x + 1 \neq 0 \Rightarrow \tan x \neq -1 \Rightarrow \frac{\sin x}{\cos x} \neq -1 \Rightarrow \sin x \neq -\cos x \Rightarrow x \neq \frac{5\pi}{4}, \frac{3\pi}{4} \Rightarrow x \neq \{k\pi + \frac{3\pi}{4}\} \text{ ③}$ $\text{①} \cap \text{②} \cap \text{③} \Rightarrow D_f = \mathbb{R} - \{k\pi + \frac{\pi}{2}, k\pi + \frac{3\pi}{4}, k\pi\}$ $\Rightarrow -\frac{1}{2} \leq \sin x \leq \frac{1}{2} \Rightarrow x = [k\pi - \frac{\pi}{6}, k\pi + \frac{\pi}{6}] \Rightarrow D_f = [k\pi - \frac{\pi}{6}, k\pi + \frac{\pi}{6}]$ $\text{ب) } 2\sin x - 1 \geq 0 \Rightarrow 2\sin x \geq 1 \Rightarrow \sin x \geq \frac{1}{2} \Rightarrow x = [k\pi + \frac{\pi}{6}, 2k\pi + \frac{5\pi}{6}]$ $\Rightarrow D_f = [2k\pi + \frac{\pi}{6}, 2k\pi + \frac{5\pi}{6}]$	6
$\text{ب) } 1 - 2\cos x \geq 0 \Rightarrow 2\cos x \leq 1 \Rightarrow \cos x \leq \frac{1}{2} \Rightarrow x = [2k\pi + \frac{\pi}{3}, 2k\pi + \frac{5\pi}{3}]$ $\Rightarrow D_f = [2k\pi + \frac{\pi}{3}, 2k\pi + \frac{5\pi}{3}]$	7
$\text{ج) } -1 \leq x^2 + 2x + 1 \leq 1$ $\Rightarrow -1 \leq x^2 + 2x + 1 \Rightarrow 0 \leq x^2 + 2x + 2 \xrightarrow{-\frac{1}{4} - \frac{1}{4}} \frac{-1-1}{2} \Rightarrow x = (-\infty, -2] \cup [-1, +\infty) \text{ ①}$ $\Rightarrow x^2 + 2x + 1 \leq 1 \Rightarrow x^2 + 2x \leq 0 \xrightarrow{-\frac{1}{4} - \frac{1}{4}} \frac{-1-1}{2} \Rightarrow x = [-2, 0] \text{ ②}$ $\text{①} \cap \text{②} = [-2, -2] \cup [-1, 0] \Rightarrow D_f = [-2, -2] \cup [-1, 0]$ $\text{①} \cap \text{②} = [2, 2] \cup [1, \infty) \Rightarrow D_f = [2, 2] \cup [1, \infty)$	8
$\text{الف) } x > 0$ $1 - \log_x x > 0 \Rightarrow \log_x x < 1 \Rightarrow x < x \Rightarrow x = (0, x) \Rightarrow D_f = (0, x)$	
$\text{ب) } x > 0$ $1 - \log_{\frac{1}{x}} x > 0 \Rightarrow \log_{\frac{1}{x}} x < 1 \Rightarrow x > \frac{1}{x} \Rightarrow x = (\frac{1}{x}, +\infty) \Rightarrow D_f = (\frac{1}{x}, +\infty)$	9
$\text{ج) } x^2 - x^2 - 1 \geq 0 \Rightarrow x^2 - x^2 \geq 1 \Rightarrow x^2 - x^2 \geq 1 \Rightarrow x^2 - x^2 \geq 1 \Rightarrow -x^2 + x^2 - 1 \geq 0$ $\Rightarrow \frac{1}{-1+1} \Rightarrow x = [1, x] \Rightarrow D_f = [1, x]$	
$\text{د) } \frac{x^2 + 1}{x^2 + 1} \in W \Rightarrow x \in -\frac{x^2 + 1}{x^2 + 1} \Rightarrow D_f = \{x x = \frac{1 - x^2}{x^2 + 1}, x \in W\}$	10