

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