

الف) $\cos x \neq 0 \Rightarrow \cos x = \frac{1}{2} \Rightarrow x = R - \left\{ 2k\pi + \frac{\pi}{3}, 2k\pi - \frac{\pi}{3} \right\}$

ب) $\cos x = 1 \Rightarrow \cos x \neq 1 \Rightarrow x \neq 2k\pi$

$D_f = R - \{2k\pi\}$

✓

الف) $\left[\begin{aligned} \tan x \neq 0 &\Rightarrow \tan x \neq -1 \Rightarrow x \neq k\pi - \frac{\pi}{4} \\ \cos x \neq 0 &\Rightarrow x \neq k\pi + \frac{\pi}{2} \end{aligned} \right] \Rightarrow D_f = R - \left\{ k\pi + \frac{\pi}{4}, k\pi - \frac{\pi}{4} \right\}$

ب) $\left[\begin{aligned} \cot x \neq 1 &\Rightarrow \cot x \neq 1 \Rightarrow x \neq k\pi + \frac{\pi}{4} \\ \sin x \neq 0 &\Rightarrow x \neq k\pi \end{aligned} \right] \Rightarrow$

$\Rightarrow D_f = R - \left\{ k\pi, k\pi + \frac{\pi}{4} \right\}$

✓

الف) $-1 < x^2 - 2 < 1 \Rightarrow \begin{cases} x^2 - 2 < 1 \Rightarrow x^2 < 3 \Rightarrow -\sqrt{3} < x < \sqrt{3} \\ x^2 - 2 > -1 \Rightarrow x^2 > 1 \Rightarrow x < -1 \text{ or } x > 1 \end{cases} \Rightarrow$

$D_f = [-\sqrt{3}, -1) \cup (1, \sqrt{3}]$

✓

ب) $\begin{cases} x > 0 \\ -1 < \sqrt{x} - 2 < 1 \Rightarrow 2 < \sqrt{x} < 3 \Rightarrow 4 < x < 9 \end{cases} \Rightarrow D_f = (4, 9)$

الف) $-1 < |x - 2| < 3 \Rightarrow \begin{cases} |x - 2| < 3 \Rightarrow -1 < x < 5 \\ |x - 2| > 1 \Rightarrow x < 1 \text{ or } x > 3 \end{cases} \Rightarrow$

$D_f = [-1, 1) \cup (3, 5]$

✓

ب) $-1 < x^2 + 2x + 1 < 1 \Rightarrow \begin{cases} x^2 + 2x + 1 > -1 \Rightarrow x^2 + 2x + 2 > 0 \Rightarrow (x+1)(x+2) > 0 \Rightarrow x < -2 \text{ or } x > -1 \\ x^2 + 2x + 1 < 1 \Rightarrow x^2 + 2x < 0 \Rightarrow x(x+2) < 0 \Rightarrow -2 < x < 0 \end{cases} \Rightarrow$

$D_f = [-2, 0]$

الف) $x^2 - 4 > 0 \Rightarrow (x-2)(x+2) > 0 \Rightarrow \begin{cases} x > 2 \\ x < -2 \end{cases} \Rightarrow D_f = (-\infty, -2) \cup (2, +\infty)$

ب) $2 - |x| > 0 \Rightarrow |x| < 2 \Rightarrow -2 < x < 2 \Rightarrow D_f = (-2, 2)$

✓

$$\begin{aligned} \text{الف) } & \left. \begin{aligned} (x-1) &= 0 \Rightarrow x=1 \\ x-1 &= 0 \Rightarrow x=1 \\ x-1 &= 0 \Rightarrow x=1 \end{aligned} \right\} \Rightarrow D_f = (1, \infty) - \{1\} \\ \text{ب) } & \left. \begin{aligned} (x+1) &= 0 \Rightarrow x=-1 \\ x+1 &= 0 \Rightarrow x=-1 \\ x-1 &= 0 \Rightarrow x=1 \end{aligned} \right\} \Rightarrow D_f = (-\infty, -1) \cup (1, +\infty) - \{1\} \end{aligned}$$

$$\begin{aligned} \text{الف) } & \left. \begin{aligned} (x-1) &= 0 \Rightarrow x=1 \\ (x^2-4x+3) &= 0 \Rightarrow (x-1)(x-3) = 0 \Rightarrow x=1 \text{ or } x=3 \end{aligned} \right\} \Rightarrow D_f = (1, +\infty) - \{1, 3\} \\ \text{ب) } & \left. \begin{aligned} (x+1) &= 0 \Rightarrow x=-1 \\ (x-1) &= 0 \Rightarrow x=1 \\ (x+1) &= 0 \Rightarrow x=-1 \end{aligned} \right\} \Rightarrow D_f = (-\infty, -1) \cup (-1, 1) \cup (1, +\infty) \end{aligned}$$

$$\begin{aligned} \text{الف) } & \left. \begin{aligned} (x-1) &= 0 \Rightarrow x=1 \\ (x-1) &= 0 \Rightarrow x=1 \\ (x-1) &= 0 \Rightarrow x=1 \end{aligned} \right\} \Rightarrow D_f = (1, \infty) \\ \text{ب) } & \left. \begin{aligned} (x) &= 0 \Rightarrow x=0 \\ (x-1) &= 0 \Rightarrow x=1 \\ (x-1) &= 0 \Rightarrow x=1 \end{aligned} \right\} \Rightarrow D_f = (1, +\infty) \end{aligned}$$

$$\begin{aligned} \text{الف) } & (x+1) \neq 0 \Rightarrow x \neq -1 \Rightarrow D_f = \mathbb{R} \\ \text{ب) } & (x-1) \neq 0 \Rightarrow x \neq 1 \Rightarrow D_f = \mathbb{R} - \{1\} \\ \text{ج) } & (x-1) \neq 0 \Rightarrow x \neq 1 \Rightarrow x = \log_r r \Rightarrow D_f = \mathbb{R} - [\log_r r] \Rightarrow D_f = \mathbb{R} - \left[\frac{1}{r}\right] \\ \text{د) } & (x-1) \neq 0 \Rightarrow x \neq 1 \Rightarrow x = \log_r r \Rightarrow D_f = \mathbb{R} - [\log_r r] \end{aligned}$$

$$\begin{aligned} \text{الف) } & (x+1) \in W \Rightarrow x \in \frac{W-1}{r} \Rightarrow D_f = \left\{ x/x = \frac{k-1}{r}, k \in W \right\} \\ \text{ب) } & \frac{rx-1}{rx-1} \in W \Rightarrow rxW-1W = rx-1 \Rightarrow rx-1W = r-1W \\ \text{ج) } & x = \frac{r-1W}{r-1W} \Rightarrow D_f = \left\{ x/x = \frac{rk-1}{rk-1}, k \in W \right\} \end{aligned}$$