

19, 20

الف) $\frac{\sin x - 2}{y \cos x + 1} \geq 0$ $y \cos x + 1 \neq 0$ $y \cos x \neq -1$ $\cos x \neq \frac{-1}{y}$ $x \neq \pi, 2\pi$

$\partial_f = \mathbb{R} - \{2k\pi + \frac{\pi}{y}, 2k\pi + \frac{3\pi}{y}\}$

ب) $\frac{\sin x + 3}{\cos x - 1} \geq 0$ $\cos x - 1 \neq 0$ $\cos x \neq 1 \rightarrow \{2k\pi\} \rightarrow \partial_f = \mathbb{R} - \{2k\pi\}$

الف) $\frac{y \sin x + 1}{\tan x + 1} \geq 0$ $\tan x + 1 \neq 0$ $\frac{\sin x}{\cos x} + 1 \neq 0$ $\frac{\sin x}{\cos x} \neq -1$ $\partial_f = \mathbb{R} - \{k\pi + \frac{\pi}{2}, k\pi - \frac{\pi}{2}\}$

ب) $\frac{\cos x + 1}{\cot x - 1} \geq 0$ $\cot x - 1 \neq 0$ $\cot x \neq 1 \rightarrow x \neq k\pi + \frac{\pi}{4}$ $\partial_f = \mathbb{R} - \{k\pi + \frac{\pi}{4}, k\pi - \frac{\pi}{4}\}$

الف) $\sin y = x^2 - 2$ $-1 \leq x^2 - 2 \leq 1$ $-1 \leq x^2 - 2 \Rightarrow x^2 \geq 1 \Rightarrow x \leq -1, x \geq 1$ $x^2 - 2 \leq 1 \Rightarrow x^2 \leq 3 \Rightarrow -\sqrt{3} \leq x \leq \sqrt{3}$ $\partial_f = [-\sqrt{3}, -1] \cup [1, \sqrt{3}]$

ب) $y = \arccos(\sqrt{x} - 3)$ $-1 \leq \sqrt{x} - 3 \leq 1$ $-1 \leq \sqrt{x} - 3 \Rightarrow \sqrt{x} \geq 2 \Rightarrow x \geq 4$ $\sqrt{x} - 3 \leq 1 \Rightarrow \sqrt{x} \leq 4 \Rightarrow x \leq 16$ $\partial_f = [4, 16]$

ج) $\cos y = |x| - 3 \Rightarrow -1 \leq |x| - 3 \leq 1$ $-1 \leq |x| - 3 \Rightarrow |x| \geq 2 \Rightarrow x \leq -2, x \geq 2$ $|x| - 3 \leq 1 \Rightarrow |x| \leq 4 \Rightarrow -4 \leq x \leq 4$ $\partial_f = [-4, -2] \cup [2, 4]$

د) $y = \arcsin(x^2 + 3x + 1)$ $-1 \leq x^2 + 3x + 1 \leq 1$ $x^2 + 3x + 1 \geq -1 \Rightarrow x^2 + 3x + 2 \geq 0 \Rightarrow (x+1)(x+2) \geq 0 \Rightarrow x \leq -2, x \geq -1$ $x^2 + 3x + 1 \leq 1 \Rightarrow x^2 + 3x \leq 0 \Rightarrow x(x+3) \leq 0 \Rightarrow -3 \leq x \leq 0$ $\partial_f = [-3, -1] \cup [-2, 0]$

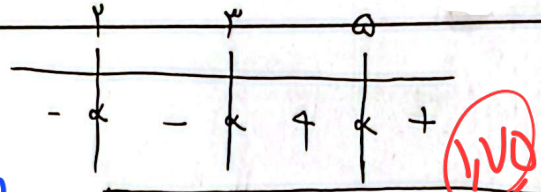
$\log_3 x^2 - 2 \rightarrow \log_3 (x+2)(x-2) \rightarrow \frac{(x+2)(x-2)}{3} > 0$ $x \neq \pm 2$ $\partial_f = (-\infty, -2) \cup (2, +\infty)$

$\log_3 2 - |x| \rightarrow 2 - |x| > 0$ $2 > |x|$ $-2 < x < 2$ $\partial_f = (-2, 2)$

ω, τ, τ

$$\log \frac{\omega - \tau}{\tau - \tau}$$

$$\begin{aligned} \omega - \tau > 0 &\rightarrow \omega > \tau \\ \tau - \tau > 0 &\rightarrow \tau > \tau \\ \tau - \tau \neq 1 &\rightarrow \tau \neq \tau \end{aligned}$$

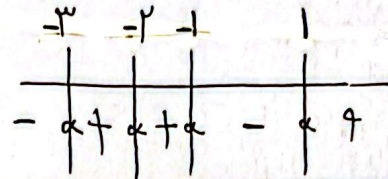


$$D_f = (\tau, +\infty) - \{0\}$$

$$D_f = (\tau, \omega) - \{1\}$$

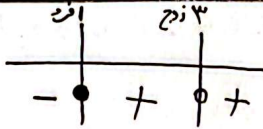
$$\log \frac{\tau^2 - 1}{\tau + \tau} \rightarrow \log \frac{(\tau+1)(\tau-1)}{\tau + \tau}$$

$$\begin{aligned} (\tau+1)(\tau-1) > 0 &\rightarrow \tau \neq \pm 1 \\ \tau + \tau > 0 &\rightarrow \tau \neq -\tau \\ \tau + \tau \neq 1 &\rightarrow \tau \neq \tau \end{aligned}$$



$$D_f = (-\tau, -1) \cup (-1, 1) \cup (1, +\infty)$$

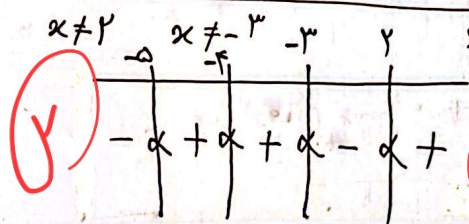
$$\log \frac{\tau^2 - \tau\tau + \tau}{\tau - \tau} \rightarrow \frac{(\tau-1)(\tau-\tau)}{(\tau-\tau)}$$



$$D_f = (1, +\infty) - \{1\}$$

$$\log \frac{\tau + \tau}{\tau - \tau}$$

$$\begin{aligned} \frac{\tau + \tau}{\tau - \tau} > 0 &\rightarrow \tau - \tau \neq 0 \quad \tau \neq \tau \\ \tau + \tau > 0 &\rightarrow \tau \neq -\tau \\ \tau + \tau \neq 1 &\rightarrow \tau \neq -\tau \end{aligned}$$



$$\begin{aligned} \log \frac{\tau^2 - \log(\tau - \tau)}{\tau} &\rightarrow \tau - \log \frac{\tau^2}{\tau} \\ \tau > \tau &\rightarrow D_f = (\tau, 10] \end{aligned}$$

$$\log \frac{\tau^2}{\tau} \geq 0 \quad \wedge \tau > \tau$$

$$\begin{aligned} \log(\tau \log \tau^2 - 1) &\rightarrow \tau \log \tau^2 - 1 > 0 \\ \tau > \tau^{\frac{1}{\tau}} &\rightarrow \tau > \sqrt{\tau} \end{aligned}$$

$$D_f = (\sqrt{\tau}, +\infty)$$

$$\frac{\tau}{\tau^2 + 1} \quad \tau^2 + 1 \neq 0 \quad \tau^2 \neq -1$$

$$D_f = \mathbb{R}$$

$$\frac{\tau}{\tau^2 - 1} \quad \tau^2 - 1 \neq 0 \quad \tau^2 \neq 1$$

$$D_f = \mathbb{R} - \{0, 1\}$$

$$\frac{\tau}{\tau^2 - \tau} \quad \tau^2 - \tau \neq 0 \quad \tau^2 \neq \tau$$

$$D_f = \mathbb{R} - \{0, 1\}$$

$$\frac{\tau}{\tau^2 - \tau} \quad \tau^2 - \tau \neq 0 \quad \tau^2 \neq \tau$$

$$D_f = \mathbb{R} - \{0, 1\}$$

$$\begin{aligned} \tau x + 1 \in \omega &\quad \tau x \in \omega - 1 \\ x \in \frac{\omega - 1}{\tau} \end{aligned}$$

$$D_f = \{x \mid x \in \frac{\omega - 1}{\tau}, k \in \omega\}$$

$$\frac{\tau x - \tau}{\tau x - \omega} \in \omega \rightarrow \tau x - \tau \in \tau \omega - \omega \tau$$

$$\tau x - \tau \omega x = \tau - \omega \tau \rightarrow x = \frac{\tau - \omega \tau}{\tau - \tau \omega}$$

$$D_f = \{x \mid x \in \frac{\tau - \omega \tau}{\tau - \tau \omega}, k \in \omega\}$$