

الف) $y = \frac{\sin x - 2}{2\cos x + 1} \rightarrow 2\cos x + 1 \neq 0 \rightarrow 2\cos x \neq -1 \rightarrow \cos x \neq -\frac{1}{2}$
 $D_f = \mathbb{R} - \left[2k\pi + \frac{\pi}{3}, 2k\pi - \frac{\pi}{3}\right]$

ب) $y = \frac{\sin x + 3}{\cos x - 1} \rightarrow \cos x - 1 \neq 0 \rightarrow \cos x \neq 1$
 $D_f = \mathbb{R} - [k\pi]$

الف) $y = \frac{2\sin x + 1}{\tan x + 1} \rightarrow \begin{cases} \tan x + 1 \neq 0 \rightarrow \tan x \neq -1 \\ \cos x \neq 0 \end{cases}$
 $D_f = \mathbb{R} - \left[k\pi + \frac{\pi}{4}, k\pi - \frac{\pi}{4}\right]$

ب) $y = \frac{\cos x + 1}{\cot x - 1} \rightarrow \begin{cases} \cot x \neq 1 \\ \sin x \neq 0 \end{cases}$
 $D_f = \mathbb{R} - \left[k\pi + \frac{\pi}{4}, k\pi\right]$

الف) $\sin y = x^2 - 2 \rightarrow -1 \leq x^2 - 2 \leq 1 \xrightarrow{+2} 1 \leq x^2 \leq 3 \rightarrow 1 \leq |x| \leq \sqrt{3}$
 $D_f = [-\sqrt{3}, -1] \cup [1, \sqrt{3}]$

ب) $y = \arccos(\sqrt{x} - 3) \rightarrow -1 \leq \sqrt{x} - 3 \leq 1 \xrightarrow{+3} 2 \leq \sqrt{x} \leq 4 \rightarrow 4 \leq x \leq 16$
 $D_f = [4, 16]$

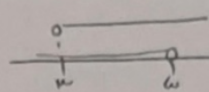
الف) $\cos y = |x| - 3 \rightarrow -1 \leq |x| - 3 \leq 1 \xrightarrow{+3} 2 \leq |x| \leq 4 \rightarrow 2 \leq x \leq 4$
 $D_f = [-4, -2] \cup [2, 4]$

ب) $y = \arcsin(x^2 + 3x + 1) \rightarrow -1 \leq x^2 + 3x + 1 \leq 1$
 $D_f = [-3, -2] \cup [-1, 0]$

الف) $\log_3 x^{x-2} \rightarrow x^{x-2} > 0 \rightarrow x^{x-2} > 0 \rightarrow x > 2$
 $D_f = (-\infty, -2) \cup (2, +\infty)$

ب) $y = \log_2^{2-|x|} \rightarrow 2 - |x| > 0 \rightarrow 2 > |x| \rightarrow -2 < x < 2$
 $D_f = (-2, 2)$

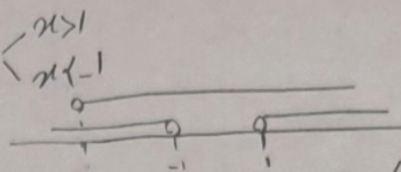
الف) $y = \log_{x-3} \omega - x$
 $\omega - x > 0 \rightarrow \omega > x$
 $x - 3 > 0 \rightarrow x > 3$
 $x - 3 \neq 1 \rightarrow x \neq 4$



$D_f = (3, 4) - \{4\}$

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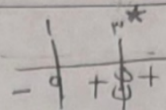
ب) $y = \log_{x+3} x^2 - 1$
 $x^2 - 1 > 0 \rightarrow x^2 > 1 \rightarrow |x| > 1$
 $x + 3 > 0 \rightarrow x > -3$
 $x + 3 \neq 1 \rightarrow x \neq -2$



$D_f = (-3, -2) - \{-2\} \cup (-1, +\infty)$

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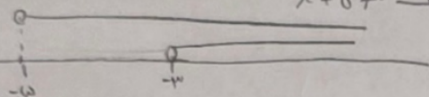
الف) $y = \log_{x-3} \frac{x^2 - 4x + 3}{x-3} \rightarrow \frac{(x-1)(x-3)}{x-3} > 0$



$(-1, 3) \cup (3, +\infty)$

ب) $y = \log_{x+\omega} \frac{x+\omega}{x-3}$
 $\frac{x+\omega}{x-3} > 0 \rightarrow x+\omega > 0 \rightarrow x > -\omega$
 $x+\omega > 0 \rightarrow x > -\omega$
 $x+\omega \neq 1 \rightarrow x \neq 1-\omega$

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



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الف) $y = \sqrt{3 - \log_2(x-2)}$
 $x-2 > 0 \rightarrow x > 2$
 $3 - \log_2(x-2) \geq 0 \rightarrow 3 \geq \log_2(x-2) \rightarrow 1 \geq x-2 \rightarrow 1 \geq x$

$\Rightarrow D_f = [2, 3]$

ب) $y = \log(2 \log_3 x - 1)$
 $2 \log_3 x - 1 > 0 \rightarrow 2 \log_3 x > 1 \rightarrow \log_3 x > \frac{1}{2} \rightarrow x > \sqrt{3}$

$\Rightarrow D_f = (\sqrt{3}, +\infty)$

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الف) $y = \frac{3}{x^2+1} \rightarrow x^2+1 \neq 0 \rightarrow x^2 \neq -1$
 $D_f = \mathbb{R}$

ب) $y = \sqrt{\frac{3}{x^2-1}} \rightarrow x^2-1 \neq 0 \rightarrow x^2 \neq 1 \rightarrow D_f = \mathbb{R} - \{-1, 1\}$

ج) $y = \sqrt{\frac{3}{x^2-2}} \rightarrow x^2-2 \neq 0 \rightarrow x^2 \neq 2 \rightarrow \log_2 2 \neq x \rightarrow D_f = \mathbb{R} - \{\log_2 2\}$

د) $y = \sqrt{\frac{3}{x^2-3}} \rightarrow x^2-3 \neq 0 \rightarrow x^2 \neq 3 \rightarrow \log_2 3 \neq x \rightarrow D_f = \mathbb{R} - \{\log_2 3\}$

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الف) $(x+1)! \rightarrow x+1 \in \mathbb{N} \rightarrow x \in \mathbb{N} - 1 \rightarrow x \in \frac{n-1}{2} \rightarrow D_f = \{x \mid x \in \frac{n-1}{2}, n \in \mathbb{N}\}$

ب) $(\frac{3x-2}{2x-5})! \rightarrow \frac{3x-2}{2x-5} \in \mathbb{N} \rightarrow 3x-2 \in 2x-5 \rightarrow 3x-2 \in \mathbb{N} \rightarrow x \in \frac{2-5n}{3-2n}$

$D_f = \{x \mid x \in \frac{2-5n}{3-2n}, n \in \mathbb{N}\}$

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