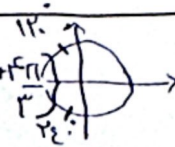


الف) $y = \frac{\sin x - 2}{2 \cos x + 1}$

$2 \cos x + 1 \neq 0$
 $\cos x \neq -\frac{1}{2}$

$D_f = \mathbb{R} - \left\{ \frac{2\pi}{3}, \frac{4\pi}{3} \right\}$



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ب) $y = \frac{\sin x + 3}{\cos x - 1}$

$\cos x - 1 \neq 0$
 $\cos x \neq 1$

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



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الف) $y = \frac{2 \sin x + 1}{\tan x + 1}$

$\tan x + 1 \neq 0$
 $\tan x \neq -1$

$D_f = \mathbb{R} - \left\{ k\pi + \frac{3\pi}{4}, k\pi + \frac{7\pi}{4} \right\}$



ب) $y = \frac{\cos x + 1}{\cot x - 1}$

$\cot x - 1 \neq 0 \Rightarrow \cot x \neq 1$

$\cot x - 1 \rightarrow \frac{\cos x}{\sin x} \Rightarrow \sin x \neq 0$

$D_f = \mathbb{R} - \left\{ k\pi, k\pi + \pi \right\}$



الف) $\sin y = x^2 - 2$

$-1 \leq x^2 - 2 \leq 1$

$(I) \cap (II)$

$D_f = [-1, 1]$

$-1 \leq x^2 - 2$

$x^2 \geq 1 \Rightarrow x \geq 1 \text{ (I)}$
 $x \leq -1$

$x^2 - 2 \leq 1$

$x^2 \leq 3$
 $-\sqrt{3} \leq x \leq \sqrt{3} \text{ (II)}$

$-1 \leq \sqrt{x} - 2 \leq 1$
 $x \leq 16$

ب) $y = \arccos(\sqrt{x} - 2)$

$D_f = [4, 16]$

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الف) $\cos y = |x| - 3$

$-1 \leq |x| - 3 \leq 1$

$D_f = [-4, -2] \cup [2, 4]$

$|x| \geq 2$
 $x \geq 2$
 $x \leq -2$

$|x| - 3 \leq 1$
 $|x| \leq 4$
 $-4 \leq x \leq 4$

$-1 \leq x^2 + 3x + 1 \leq 1$

$\frac{x(x+3)}{x^2+3x+1} \leq \frac{x^2-1}{x^2+3x+1}$
 $\frac{x^2-1}{x^2+3x+1} \leq \frac{x^2-1}{x^2+3x+1}$

ب) $y = \arcsin(x^2 + 3x + 1)$

$D_f = (-\infty, -2] \cup [2, +\infty)$

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الف) $y = \log_{\frac{1}{2}}(x^2 - 4)$

$x^2 - 4 > 0$
 $x^2 > 4 \rightarrow x > 2$
 $x < -2$

$D_f = (-\infty, -2) \cup (2, +\infty)$

ب) $y = \log_{\frac{1}{2}}(x - |x|)$

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

۵

الف) $y = \log_{m-r} \omega - m$ $\omega - m > 0$ $m - r > 0$
 $m < \omega$ $m > r$ $D_f = (r, \omega) - \{ \varepsilon \}$
 $\omega - m \neq 1 \Leftrightarrow m \neq \varepsilon$

ب) $y = \log_{m+r} \frac{m^2-1}{m-r}$ $\frac{m^2-1}{m-r} > 0$ $m+r > 0$ $m-r > 0$
 $m > -r$ $m > 1$ $D_f = (-r-1) \cup (1, +\infty) - \{ -r \}$
 $m \neq -1$ $m < -1$

الف) $y = \log_{m-r} \frac{m^2 - \varepsilon m + r}{m-r}$ $\frac{(m-r)(m-1)}{(m-r)} > 0$ $\frac{1}{-1} + \frac{1}{1} = 0$ $D_f = (1, r) \cup (r, +\infty)$

ب) $y = \log_{m+r} \frac{m+r}{m-r}$ $\frac{m+r}{m-r} > 0$ $m+r > 0$ $m-r > 0$
 $m > -r$ $m > -\varepsilon$ $D_f = (-\omega, -r) \cup (r, +\infty) - \{ -r \}$
 $m \neq -\varepsilon$

الف) $y = \sqrt{r \cdot \log_{m-r} m}$ $r \cdot \log_{m-r} m > 0 \Rightarrow r \cdot \log_{m-r} m \leq 1$
 $\log_{m-r} m \leq \frac{1}{r}$ $m < 1$ $m-r > 0 \Rightarrow m > r$
 $D_f = (r, 1] \cup (r, +\infty)$

ب) $y = \log_{m-r} (r \log_{m-r} m - 1)$ $\log_{m-r} m > \frac{1}{r}$ $m > r^{\frac{1}{r}} \rightarrow m > \sqrt[r]{r}$

الف) $y = \frac{r}{\varepsilon^m + 1}$ $\varepsilon^m + 1 \neq 0$ $\varepsilon^m \neq -1$ $D_f = R - \{ \log_{\varepsilon}^{-1} \}$
 ب) $y = \frac{r}{\varepsilon^m - 1}$ $\varepsilon^m - 1 \neq 0$ $\varepsilon \neq 1$ $D_f = R - \{ \log_{\varepsilon}^1 \}$
 ج) $y = \frac{r}{\varepsilon^m - r}$ $\varepsilon^m - r \neq 0$ $\varepsilon \neq r$ $D_f = R - \{ \log_{\varepsilon}^r \}$

د) $y = \frac{r}{\varepsilon^m - r}$ $D_f = R - \{ \log_{\varepsilon}^r \}$ $\varepsilon^m - r \neq 0$ $m \neq r$

الف) $y = (\varepsilon m + 1)!$ $\varepsilon m + 1 \in \mathbb{N}$ $m \in \frac{\mathbb{N}-1}{\varepsilon}$
 $D_f = \{ m \mid m = \frac{k-1}{\varepsilon}, k \in \mathbb{N} \}$

ب) $y = \frac{(r m - r)}{(r m - \delta)}$ $\frac{r m - r}{r m - \delta} \in \mathbb{N}$ $r m - r \in \mathbb{N}$ $m \in \frac{-\delta \mathbb{N} + r}{r - r \mathbb{N}}$
 $D_f = \{ m \mid m = \frac{\omega k - r}{r k - r}, k \in \mathbb{N} \}$