

الف) $\frac{x^3 - 4x}{x^3 - x} \geq 0 \xrightarrow{\text{منح}} x^3 - x \neq 0 \rightarrow x(x^2 - 1) \rightarrow x(x-1)(x+1) \xrightarrow{\text{صورت}} x^3 - 4x \rightarrow x(x^2 - 4) \rightarrow x(x-2)(x+2)$

$\frac{-1}{-1} + \frac{0}{0} + \frac{1}{1} + \frac{4}{4} +$ $D_f = (-1, 0) \cup (0, 1) \cup [4, +\infty)$

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ب) $\frac{x^5 - x^3}{x^3 - x} \geq 0 \xrightarrow{\text{منح}} x^3 - x \neq 0 \rightarrow x(x^2 - 1) \rightarrow x(x-1)(x+1) \xrightarrow{\text{صورت}} x^5 - x^3 \rightarrow x^3(x^2 - 1) \rightarrow x^3(x-1)(x+1)$

$\frac{-1}{-1} + \frac{0}{0} + \frac{1}{1} + \frac{1}{1} +$ $D_f = (-\infty, -1) \cup (-1, 0) \cup (0, 1) \cup (1, +\infty)$

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الف) $x + |x| > 0 \rightarrow \begin{cases} |x| = x \rightarrow x + x > 0 \rightarrow 2x > 0 \rightarrow x > 0 \\ |x| = -x \rightarrow x + (-x) > 0 \rightarrow 0 > 0 \end{cases} \rightarrow D_f = (0, +\infty)$

ب) $x + |x| > 0 \rightarrow \begin{cases} |x| = x \rightarrow x^2 > 0 \checkmark \\ |x| = -x \rightarrow -x^2 > 0 \times \end{cases} \rightarrow D_f = (0, +\infty)$

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الف) $2 - [x] \geq 0 \rightarrow [x] \leq 2 \rightarrow x < 3 \rightarrow D_f = (-\infty, 3)$

ب) $2 - [x] > 0 \rightarrow [x] < 2 \rightarrow D_f = (-\infty, 2)$

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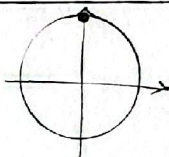
الف) $\left[x - \frac{1}{x}\right] + \left[x + \frac{1}{x}\right] \geq 0 \rightarrow x + \frac{1}{x} \leq x - \frac{1}{x} + 1 \rightarrow \left[x + \frac{1}{x}\right] = t + 1 \rightarrow t(t+1) \geq 0 \rightarrow$

$2t+1 \geq 0 \rightarrow t \geq -\frac{1}{2} \xrightarrow{\text{چون برکت}} t \geq 0 \rightarrow x - \frac{1}{x} \geq 0 \rightarrow x \geq \frac{1}{x} \rightarrow D_f = \left[\frac{1}{x}, +\infty\right)$

ب) $\left[x - \frac{1}{x}\right] + \left[-x + \frac{1}{x}\right] \geq 0 \rightarrow [a] + [-a] = \begin{cases} 0 & a \in \mathbb{Z} \\ -1 & a \notin \mathbb{Z} \end{cases} \rightarrow x = \frac{1}{x} + n \quad (n \in \mathbb{Z})$

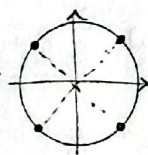
$D_f = \left\{\frac{1}{x} + n \mid n \in \mathbb{Z}\right\}$

الف) $\sin x - 1 \neq 0 \rightarrow \sin x \neq 1$



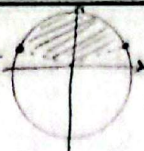
$D_f = \mathbb{R} - \left\{k\pi + \frac{\pi}{2}\right\}$

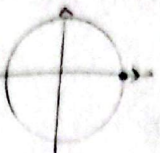
ب) $2\sin^2 x - 1 \neq 0 \rightarrow 2\sin^2 x \neq 1 \rightarrow \sin^2 x \neq \frac{1}{2} \rightarrow \sin x \neq \pm \frac{\sqrt{2}}{2}$



$D_f = \mathbb{R} - \left\{k\pi \pm \frac{\pi}{4}\right\}$

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الف) $2\sin x - 1 \geq 0 \rightarrow \sin x \geq \frac{1}{2}$  $D_f = [2k\pi + \frac{\pi}{6}, 2k\pi + \frac{5\pi}{6}]$

ب) $\cos x - 1 \geq 0 \rightarrow \cos x \geq 1$  $D_f = \{2k\pi\}$

الف) $-1 \leq x^2 - 3 \leq 1 \xrightarrow{+3} 2 \leq x^2 \leq 4 \rightarrow x \in [-2, -\sqrt{2}] \cup [\sqrt{2}, 2]$

ب) $-1 \leq x^2 + 3x + 1 \leq 1$
 $\begin{cases} x^2 + 3x + 1 \geq -1 \rightarrow x^2 + 3x + 2 \geq 0 \rightarrow (x+1)(x+2) \geq 0 \rightarrow x \leq -2 \text{ or } x \geq -1 \\ x^2 + 3x + 1 \leq 1 \rightarrow x^2 + 3x \leq 0 \rightarrow x(x+3) \leq 0 \rightarrow -3 \leq x \leq 0 \end{cases}$
 $D_f = [-3, -2] \cup [-1, 0]$

الف) $\begin{cases} x - 2 > 0 \rightarrow x > 2 \\ 2 - \log_r^{x-1} \geq 0 \rightarrow \log_r^{x-1} \leq 2 \rightarrow x - 2 \leq 9 \rightarrow x \leq 11 \end{cases} \rightarrow D_f = (2, 11]$

ب) $x^2 - x > 0 \rightarrow x(x-1) > 0 \rightarrow x(x+1)(x-1) > 0 \rightarrow -1 < x < 0 \text{ or } x > 1$
 $D_f = (-1, 0) \cup (1, +\infty)$

الف) $e^x + 1 \neq 0 \checkmark \rightarrow D_f = \mathbb{R}$

ب) $e^x - 1 \neq 0 \rightarrow e^x \neq 1 \rightarrow x \neq 0 \rightarrow D_f = \mathbb{R} - \{0\}$

ج) $e^x - 2 \neq 0 \rightarrow e^x \neq 2 \rightarrow x \neq \log_e 2 = \frac{1}{e} \rightarrow D_f = \mathbb{R} - \{\frac{1}{e}\}$

د) $e^x - 3 \neq 0 \rightarrow e^x \neq 3 \rightarrow x \neq \log_e 3 \rightarrow D_f = \mathbb{R} - \{\log_e 3\}$

الف) $e^x + 1 \in \mathbb{W} \rightarrow e^x \in \mathbb{W} - 1 \rightarrow x \in \frac{\mathbb{W} - 1}{e} \rightarrow D_f = \left\{ \frac{k-1}{e} \mid k \in \mathbb{W} \right\}$

ب) $\frac{2x-2}{2x-5} \in \mathbb{W} \rightarrow x = -\frac{-5\mathbb{W}+2}{2\mathbb{W}-5} = \frac{5\mathbb{W}-2}{-2\mathbb{W}+5} \rightarrow D_f = \left\{ x \mid x = \frac{5k-2}{-2k+5}, k \in \mathbb{W} \right\}$