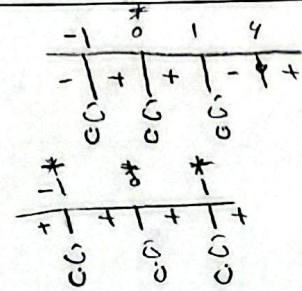


الف) $\frac{x^2 - 4x}{x^3 - x} \geq 0$ $\frac{x(x-4)}{x(x^2-1)} = \frac{x(x-4)}{x(x-1)(x+1)}$

$(-1, 1) \cup [4, +\infty)$

ب) $\frac{x^3 - x^2}{x^3 - x} \geq 0$ $\frac{x^2(x-1)}{x(x^2-1)} = \frac{x^2(x-1)(x+1)}{x(x-1)(x+1)}$

$(-\infty, -1) \cup (-1, 0) \cup (0, 1) \cup (1, +\infty)$



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الف) $\sqrt{x+|x|} \geq 0$ $x+|x| \geq 0$ $|x| \geq -x$ $D_f = \mathbb{R}^+$

ب) $\sqrt{x|x|} \geq 0$ $x|x| \geq 0 \Rightarrow D_f = \mathbb{R}^+$

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

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

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الف) $[x - \frac{1}{p}] + [x + \frac{p}{p}] \geq 0 \Rightarrow [x + \frac{p}{p} - 1] + [x + \frac{p}{p}] \geq 0$ $[x + \frac{p}{p}] - 1 + [x + \frac{p}{p}] \geq 0$ $2[x + \frac{p}{p}] \geq 1$ $[x + \frac{p}{p}] \geq \frac{1}{2} \Rightarrow x + \frac{p}{p} \geq \frac{1}{2} \Rightarrow x \geq \frac{1}{2} - \frac{p}{p} \Rightarrow [\frac{1}{2}, +\infty)$

ب) $[x - \frac{1}{p}] + [-x + \frac{1}{p}] \geq 0$ $x - \frac{1}{p} \in \mathbb{Z} \Rightarrow D = \{x / x = k + \frac{1}{p}, k \in \mathbb{Z}\}$

$[a] + [-a] = 0 \Rightarrow a \in \mathbb{Z}$

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الف) $\sin x - 1 \neq 0$ $\sin x \neq 1 \Rightarrow x \neq 90^\circ \Rightarrow D = \mathbb{R} - \{2k\pi + \frac{\pi}{2}\}$

ب) $2 \sin^2 x \neq 1$ $\sin^2 x \neq \frac{1}{2}$ $\sin x \neq \pm \frac{\sqrt{2}}{2} \Rightarrow D_f = \{ \frac{k\pi}{2} + \frac{\pi}{4} \}$

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$$r \sin x - 1 > 0 \quad r \sin x > 1 \quad \sin x > \frac{1}{r} \quad \left\{ r k \pi + \frac{\pi}{r}, r k \pi + \frac{\omega \pi}{r} \right\}$$

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$$(\cos x - 1) > 0 \quad (\cos x) > 1 \quad \{ r k \pi \}$$

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$$\text{الف) } -1 \leq |x| - 3 \leq 1 \Rightarrow r \leq |x| \leq 4 \quad r \leq x \leq 4 \quad -4 \leq x \leq -r$$

$$D = [-4, -r] \cup [r, 4]$$

$$\begin{aligned} \text{ب) } -1 \leq x^2 + 3x + 1 \leq 1 & \quad x^2 + 3x + 1 \leq 1 \quad [-3, -2] \cup [-1, 0] \\ x^2 + 3x + 2 > 0 & \quad x \leq -2 \quad x^2 + 3x \leq 0 \quad -3 \leq x \leq 0 \\ (x+1)(x+2) > 0 & \quad x > -1 \quad x(x+3) \leq 0 \end{aligned}$$

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$$\text{الف) } x - 2 > 0 \quad x > 2 \quad r - \log_{\frac{1}{r}} x - 2 > 0 \quad \log_{\frac{1}{r}} x - 2 \leq r \Rightarrow x - 2 \leq 9 \quad x \leq 11$$

$$\begin{aligned} \text{ب) } x^3 - x > 0 \quad x(x^2 - 1) > 0 & \Rightarrow x(x-1)(x+1) > 0 \\ \begin{array}{c} -1 \quad 0 \quad 1 \\ - \quad + \quad - \quad + \end{array} & \quad [-1, 0] \cup [1, +\infty) \end{aligned}$$

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$$\text{الف) } e^x \neq 1 \Rightarrow D_f = \mathbb{R}$$

$$\begin{aligned} \text{ب) } e^x - 1 \neq 0 \quad e^x \neq 1 \\ D = \mathbb{R} - \{0\} \end{aligned}$$

$$\text{ج) } e^{x-2} \neq 0 \quad e^x \neq 2$$

$$\log_{\frac{1}{e}} 2 \Rightarrow D = \mathbb{R} - \{ \log_{\frac{1}{e}} 2 \}$$

$$\text{د) } e^{x-2} \neq 0 \quad e^x \neq 2$$

$$\log_{\frac{1}{e}} 2 \Rightarrow D = \mathbb{R} - \{ \log_{\frac{1}{e}} 2 \}$$

$$\text{الف) } kx + 1 \in \omega \quad kx \in \omega - 1 \quad x \in \frac{\omega - 1}{k} \Rightarrow D = \left\{ x \mid x = \frac{k-1}{r}, k \in \omega \right\}$$

$$\begin{aligned} \text{ب) } \frac{rx - r}{r\omega - \omega} \in \omega \quad rx - r \in r\omega - \omega \quad rx - r\omega = r - \omega \Rightarrow \\ x = \frac{r - \omega}{r - r\omega} \end{aligned}$$

$$D = \left\{ x \mid x = \frac{r - \omega k}{r - rk}, k \in \omega \right\}$$

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