

الف) $y = \frac{x^2 - 4x}{x^3 - x} \geq 0 \rightarrow x^3 - x \neq 0 \rightarrow \begin{cases} x^2 - 4x = x(x+4) \\ x^3 - x = x(x^2 - 1) = x(x+1)(x-1) \end{cases}$

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

ب) $y = \frac{x^5 - x^3}{x^3 - x} \geq 0 \rightarrow x^3 - x \neq 0 \rightarrow \begin{cases} x^5 - x^3 = x^3(x^2 - 1) = x^3(x+1)(x-1) \\ x^3 - x = x(x^2 - 1) = x(x+1)(x-1) \end{cases}$

ج) $y = x + |x| > 0 \rightarrow |x| < x$ $D_f = (0, +\infty) \cup \mathbb{R}^+$

د) $y = \frac{1}{\sqrt{x|x|}} \rightarrow x|x| > 0 \rightarrow D_f = (0, +\infty)$

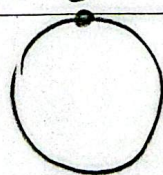
الف) $y = 2 - [x] \geq 0 \rightarrow [x] \leq 2 \rightarrow x < 3 \rightarrow D_f = (-\infty, 3)$

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

الف) $y = \sqrt{\left[x - \frac{1}{\sqrt{e}}\right] \left[x + \frac{\sqrt{e}}{e}\right]} \rightarrow \left[x - \frac{1}{\sqrt{e}}\right] \left[x + \frac{\sqrt{e}}{e}\right] \geq 0$

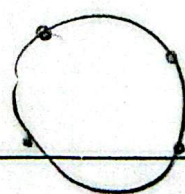
ب) $y = \sqrt{\left[x - \frac{1}{\sqrt{e}}\right] \left[-x + \frac{1}{\sqrt{e}}\right]} \rightarrow \left[x - \frac{1}{\sqrt{e}}\right] \left[-x + \frac{1}{\sqrt{e}}\right] \geq 0$

الف) $y = \frac{\sqrt{e}}{\sin x - 1}$ $\sin x - 1 \neq 0$ $\sin x \neq 1$



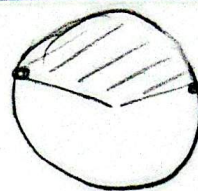
$D_f = \mathbb{R} - \left\{ 2k\pi + \frac{\pi}{\sqrt{e}} \right\}$

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



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

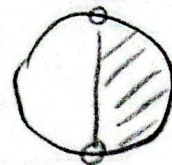
الف) $y = \sqrt{r \sin x - 1}$ $r \sin x - 1 \geq 0$
 $r \sin x \geq 1$
 $\sin x \geq \frac{1}{r}$



$D_f = [\frac{\pi}{4} + 2k\pi, \frac{3\pi}{4} + 2k\pi]$

ب) $y = \sqrt{\cos x - 1}$

$\cos x - 1 \geq 0$
 $\cos x \geq 1$



$D_f = (2k\pi - \frac{\pi}{r}, 2k\pi + \frac{\pi}{r})$

الف) $y = \sqrt{r - \log_p(x-r)}$ ① $r - \log_p(x-r) \geq 0$
 $-\log_p(x-r) \geq -r$
 $\log_p(x-r) \leq r$

$x-r \leq p^r$
 $x-r \leq 9$
 $x \leq 11$
 $x-r > 0$
 $x > r$

ب) $y = \log(x^3 - x)$

$x^3 - x > 0 \rightarrow x(x^2 - 1) > 0$
 $x(x+1)(x-1) > 0$

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

الف) $y = \frac{p}{k^x + 1}$ $k^x + 1 \neq 0$
 $k^x \neq -1$
 $D_f = \mathbb{R}$

ج) $y = \frac{p}{k^x - r}$ $k^x - r \neq 0$
 $k^x \neq r$
 $D_f = \mathbb{R} - \{\log_k r\}$

ب) $y = \frac{p}{k^x - 1}$ $k^x - 1 \neq 0$
 $k^x \neq 1$
 $x \neq 0$
 $D_f = \mathbb{R} - \{0\}$

د) $y = \frac{p}{k^x - p}$ $k^x - p \neq 0$
 $k^x \neq p$
 $D_f = \mathbb{R} - \{\log_k p\}$

الف) $y = (kx+1)!$ $\rightarrow kx+1 \in \mathbb{W} \rightarrow kx \in \mathbb{W}-1$
 $D_f = \{x \mid x = \frac{k-1}{k}, k \in \mathbb{W}\}$

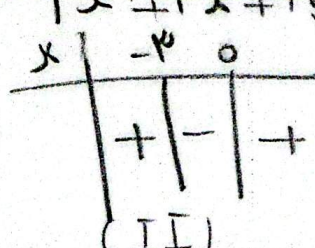
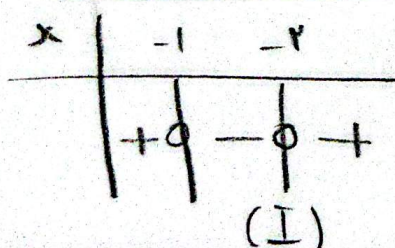
ب) $y = (\frac{kx-r}{rx-w})!$ $\rightarrow x = \frac{-\omega w - r}{rw - p} = x = \frac{+\omega w + r}{rw - p}$
 $D_f = \{x \mid x \in \frac{\omega k + r}{rk - p}, k \in \mathbb{W}\}$

الف) $\cos y = |x| - p$ $-1 \leq |x| - p \leq 1$
 $|x| \leq p \rightarrow -p \leq x \leq p$
 $|x| \geq r \rightarrow x < -r \vee x > r$

$D_f = [-p, -r] \cup [r, p]$

ب) $y = \arcsin(x^p + px + 1)$

$-1 \leq x^p + px + 1 \leq 1$
 $x^p + px + 1 \geq -1 \rightarrow x^p + px + 2 \geq 0 \rightarrow (x+1)(x^{p-1} + \dots + 1) \geq 0$
 $x^p + px + 1 \leq 1 \rightarrow x^p + px \leq 0 \rightarrow x(x^{p-1} + p) \leq 0$



$D_f = (I) \cap (II) = [-p, -1] \cup [0, +\infty)$