

$y = \sqrt{\frac{x^2 - 4x}{x^2 - x}} \rightarrow y = \sqrt{\frac{x(x-4)}{x(x-1)(x+1)}} \rightarrow y = \sqrt{\frac{x-4}{x(x+1)(x-1)}}$
 $x-4 \neq 0 \Rightarrow x \neq 4 \Rightarrow x \neq \pm 1$
 $\Rightarrow Df = (-1, 0) \cup (0, 1) \cup [4, +\infty)$
 $Df = \mathbb{R} - \{-1, 0, 4\}$

الف) $y = \sqrt{1-x}$

$1-x \geq 0 \Rightarrow x \leq 1$

$\Rightarrow x \in \mathbb{R}$

$D_f = (-\infty, 1)$

ب) $y = \frac{1}{\sqrt{1-x}}$

$1-x > 0, 1-x \neq 0$

$\Rightarrow 1-x > 0$

$\Rightarrow x < 1$

$\Rightarrow x \in \mathbb{R}$

$\Rightarrow D_f = (-\infty, 1)$

ج) $y = \frac{1}{\sqrt{1-x^2}}$

$1-x^2 > 0, 1-x^2 \neq 0$

$\Rightarrow 1-x^2 > 0$

$\Rightarrow x^2 < 1$

$\Rightarrow x < 1$

$\Rightarrow D_f = (-1, 1)$

$$\begin{aligned} \text{الف) } y &= \sqrt{\left[x - \frac{1}{x}\right] + \left[x + \frac{1}{x}\right]} \\ &= \sqrt{2\left[x + \frac{1}{x}\right] - 1} \\ &\Rightarrow \left[x + \frac{1}{x}\right] - 1 \geq 0 \\ &\Rightarrow \left[x + \frac{1}{x}\right] \geq \frac{1}{x} \\ x + \frac{1}{x} \geq \frac{1}{x} &\Rightarrow x \geq \frac{1}{x} \Rightarrow D_f = \left[\frac{1}{x}, +\infty\right) \end{aligned}$$

الف) $y = \frac{r}{\sin x - 1}$

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

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

د) $y = \frac{r}{r \sin x - 1}$

$r \sin x \neq 1$

$\Rightarrow \sin x \neq \pm \frac{1}{\sqrt{r}} = \pm \frac{\sqrt{r}}{r}$

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

الف) $y = \sqrt{r \sin x - 1}$ $\Rightarrow r \sin x - 1 \geq 0$ $\Rightarrow \sin x \geq \frac{1}{r}$ $Df = [rk\pi + \frac{\pi}{4}, rk\pi + \frac{3\pi}{4}]$	ب) $y = \sqrt{\cos x - 1}$ $\Rightarrow \cos x - 1 \geq 0$ $\Rightarrow \cos x \geq 1 \quad \text{max}(\cos x) = 1$ $\Rightarrow \cos x = 1$ $\Rightarrow Df = \{rk\pi\}$	6
الف) $\cos y = x - 2$ $\Rightarrow -1 \leq x - 2 \leq 1$ ① $-1 \leq x$ $\Rightarrow x \geq -1 \text{ و } x \leq 1$ ② $x \leq 1$ $\Rightarrow -1 \leq x \leq 1$ $\Rightarrow Df = [-1, -1] \cup [1, 1]$	ب) $y = \arcsin(x^2 + 2x + 1)$ $-1 \leq x^2 + 2x + 1 \leq 1$ ① $x^2 + 2x + 1 \geq 0 \Rightarrow (x+1)(x+1) \geq 0$ $\Rightarrow x \geq -1 \text{ و } x \leq -1$ ② $x^2 + 2x + 1 \leq 1 \Rightarrow x(x+2) \leq 0$ $\Rightarrow x \leq 0 \text{ و } x \geq -2$ $Df = [-2, -1] \cup [0, 0]$	7
الف) $y = \sqrt{2 - \log_2(x-2)}$ $\Rightarrow 2 - \log_2(x-2) \geq 0 \quad x-2 > 0$ $\Rightarrow \log_2(x-2) \leq 2 \Rightarrow x-2 \leq 4$ $\Rightarrow x \leq 6$ $\Rightarrow Df = (2, 6]$	ب) $y = \log(x^2 - x)$ $x^2 - x > 0$ $\Rightarrow x > 1$ $Df = (1, +\infty) \cup (-1, 0)$	8
الف) $y = \frac{r}{f^{x+1}}$ $f^{x+1} \neq 0$ $\Rightarrow f^x \neq -1$ $\Rightarrow x = \log_f^{-1} \cdot X \Rightarrow Df = \mathbb{R}$ ج) $y = \frac{r}{f^{x-2}}$ $f^{x-2} \neq 0$ $\Rightarrow f^x \neq 2$ $\Rightarrow x \neq \log_f 2 \Rightarrow Df = \mathbb{R} - \{\log_f 2\}$	ب) $y = \frac{r}{f^{x-1}}$ $f^{x-1} \neq 0$ $\Rightarrow f^x \neq 1$ $\Rightarrow x \neq 0 \Rightarrow Df = \mathbb{R} - \{0\}$ د) $y = \frac{r}{f^{x-2}}$ $f^{x-2} \neq 0$ $\Rightarrow x \neq \log_f 2 \Rightarrow Df = \mathbb{R} - \{\log_f 2\}$	9
الف) $y = (fx+1)!$ $fx+1 \in \mathbb{W}$ $\Rightarrow fx \in \mathbb{W}-1$ $\Rightarrow x \in \frac{\mathbb{W}-1}{f}$ $\Rightarrow Df = \left\{ \frac{k-1}{f} \mid k \in \mathbb{W} \right\}$	ب) $y = \left(\frac{rx-r}{rx-\infty} \right)!$ $\frac{rx-r}{rx-\infty} \in \mathbb{W} \Rightarrow rx-r \in rx\mathbb{W} - \infty\mathbb{W}$ $\Rightarrow rx - rx\mathbb{W} = -\infty\mathbb{W} + r$ $\Rightarrow x(1-r\mathbb{W}) = -\infty\mathbb{W} + r \Rightarrow x = \frac{-\infty\mathbb{W} + r}{1-r\mathbb{W}}$ $\Rightarrow Df = \left\{ \frac{-\infty k + r}{1-rk} \mid k \in \mathbb{W} \right\}$	10