

الف) $y = \sqrt{\frac{x^2-4x}{x^2-x}}$ $x^2-4x = x(x-4) = 0 \Rightarrow x = 0, 4$ $x^2-x = x(x+1)(x-1) = 0 \Rightarrow x = 0, \pm 1$ $\frac{-1 \ 0 \ 1 \ 4}{+ \ + \ + \ - \ +}$ $\frac{x^2-4x}{x^2-x} \geq 0$ $D_f = (-1, 0) \cup (0, 1) \cup [4, +\infty)$	ب) $y = \sqrt{\frac{x^2-x^3}{x^2-x}}$ $\frac{x^2-x^3}{x^2-x} \geq 0$ $x^2-x^3 = x^2(x-1) = x^2(x+1)(x-1) = 0 \Rightarrow x = 0, \pm 1$ $x^2-x = x(x^2-1) = x(x+1)(x-1) = 0 \Rightarrow x = 0, \pm 1$ $\frac{-1 \ 0 \ 1 \ 1}{+ \ + \ + \ - \ +}$ $D_f = \mathbb{R} - \{0, \pm 1\}$	1
الف) $y = \frac{x+1}{\sqrt{x+ x }}$ $x+ x > 0$ $\begin{cases} x > 0 & x+ x > 0 \\ x < 0 & x+ x = 0 \\ x = 0 & x+ x = 0 \end{cases}$ $D_f = \mathbb{R}^+ \cup (0, +\infty)$	ب) $y = \frac{1}{\sqrt{x x }}$ $x x > 0$ $\begin{cases} x > 0 & x x > 0 \\ x = 0 & x x = 0 \\ x < 0 & x x < 0 \end{cases}$ $D_f = \mathbb{R}^+ \cup (0, +\infty)$	۲
الف) $y = \sqrt{2-[x]}$ $2-[x] \geq 0$ $[x] \leq 2 \Rightarrow x \leq 3 \Rightarrow D_f = (-\infty, 3)$	ب) $\frac{1}{\sqrt{2-[x]}}$ $2-[x] > 0$ $[x] < 2$ $x < 3$ $D_f = (-\infty, 3)$	۳
الف) $y = \sqrt{[x-\frac{1}{x}] + [x+\frac{1}{x}]}$ $[x-\frac{1}{x}] + [x+\frac{1}{x}] \geq 0$ $[x+\frac{1}{x}-1] + [x+\frac{1}{x}]$ $[x+\frac{1}{x}] + [x+\frac{1}{x}] - 1 \geq 0 \Rightarrow 2[x+\frac{1}{x}] \geq 1$ $[x+\frac{1}{x}] \geq \frac{1}{2} \Rightarrow x+\frac{1}{x} \geq 1 \Rightarrow x \geq \frac{1}{x}$ $D_f = [\frac{1}{2}, +\infty)$	ب) $y = \sqrt{[x-\frac{1}{x}] + [x+\frac{1}{x}]}$ $[x-\frac{1}{x}] + [x+\frac{1}{x}] \geq 0$ $-(x-\frac{1}{x}) = -x+\frac{1}{x} \Rightarrow \sqrt{[x-\frac{1}{x}] + [x+\frac{1}{x}]}$ $x-\frac{1}{x} \in \mathbb{Z} \Rightarrow D_f = \{x/x = k+\frac{1}{x}, k \in \mathbb{Z}\}$	۴
الف) $y = \frac{r}{\sin x - 1}$ $\sin x - 1 \neq 0 \Rightarrow \sin x \neq 1$ $x \neq 2k\pi + \frac{\pi}{2} \Rightarrow D_f = \mathbb{R} - \{2k\pi + \frac{\pi}{2}\}$ 	ب) $y = \frac{r}{r \sin^2 x - 1}$ $r \sin^2 x - 1 \neq 0$ $r \sin^2 x \neq 1 \Rightarrow \sin^2 x \neq \frac{1}{r} \Rightarrow \sin x \neq \pm \frac{\sqrt{r}}{r}$ $D_f = \mathbb{R} - \{k\pi \pm \frac{\pi}{2}\}$ 	۵

الف) $y = \sqrt{r \sin n - 1} \quad (r \sin n - 1) \geq 0$ $r \sin n \geq 1 \quad \sin n \geq \frac{1}{r}$  $D_f = \left[2k\pi + \frac{\pi}{2}, 2k\pi + \frac{\pi}{2} \right]$	ب) $y = \sqrt{\cos n - 1} \quad (\cos n - 1) \geq 0$ $\cos n \geq 1$  $D_f = \{2k\pi\}$	6
الف) $\cos y = n - r \quad -1 \leq n - r \leq 1$ $r \leq n \leq r+1$ $r \leq n \leq r+1$ $-r-1 \leq n \leq -r$ $D_f = [-r-1, -r] \cup [r, r+1]$	ب) $y = \arcsin(n^r + r_{n+1})$ $-1 \leq n^r + r_{n+1} \leq 1$ $n^r + r_{n+1} \leq 1 \quad n^r + r_{n+1} \geq -1$ $n^r + r_{n+1} = 0 \quad n = 0, -r$ $n^r + r_{n+1} = 1 \quad n = 1, -r$ $n^r + r_{n+1} = -1 \quad n = -1, -r$ $D_f = [-r-1, -r] \cup [r, r+1]$	7
الف) $y = \sqrt{r - \log^{(n-r)}}$ $n-r \geq 0 \quad n \geq r$ $r - \log^{(n-r)} \geq 0 \quad \log^{(n-r)} \leq r$ $n-r \leq 9 \quad n \leq 11 \quad D_f = [r, 11]$	ب) $\log^{(n-r)}$ $n-r \geq 0$ $n(n+1)(n-1) = 0 \quad n = 0, \pm 1$ $D_f = (-1, 0) \cup (1, +\infty)$	8
الف) $\frac{r}{r^n + 1}$ $r^n + 1 \neq 0 \quad r^n \neq -1$ $D_f = \mathbb{R}$	ب) $y = \frac{r}{r^n - 1}$ $r^n - 1 \neq 0 \quad r^n \neq 1$ $n \neq 0 \quad D_f = \mathbb{R} - \{0\}$	9
ب) $y = \frac{r}{r^n - r}$ $r^n - r \neq 0 \quad r^n \neq r$ $n \neq \frac{1}{r} \quad D_f = \mathbb{R} - \{\frac{1}{r}\}$	ج) $\frac{r}{r^n - r}$ $r^n - r \neq 0 \quad r^n \neq r$ $n \neq \log_r r \quad D_f = \mathbb{R} - \{1\}$	10
الف) $y = (n+1)!$ $n+1 \in \omega \quad n \in \frac{\omega-1}{d}$ $D_f = \{n/n = \frac{k-1}{d}, k \in \omega\}$	ب) $y = \left(\frac{r(n-r)}{r(n-d)}\right)!$ $\frac{r(n-r)}{r(n-d)} \in \omega$ $\frac{d(n+b)}{c(n+d)} = y \Rightarrow n = \frac{dy-b}{cy-d}$ $n \in \frac{-d\omega+r}{r\omega-r} \quad D_f = \{n/n = \frac{dk+r}{r(k-r)}, k \in \omega\}$	11