

۱- الف) $y = \sqrt{\frac{n^2-4n}{n^3-n}}$
 $\frac{n^2-4n}{n^3-n} \geq 0$
 $\frac{n(n-4)}{n(n-1)(n+1)} \geq 0$
 $\frac{n-4}{(n-1)(n+1)} \geq 0$

$\frac{n-4}{(n-1)(n+1)} \geq 0$

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

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

$\frac{1-n}{n+1} \geq 0$

$D_f = \mathbb{R} - \{-1, 0, 1\}$

۲- الف) $y = \frac{n+1}{\sqrt{n+|n|}}$

$D_f = (0, +\infty)$

$n+|n| > 0$
 $|n| > -n$
 $-x$
 $+x$
 $-x$

ب) $y = \frac{1}{\sqrt{n+|n|}}$

$n+|n| > 0$
 $-x$
 $+x$
 $-x$
 $D_f = (0, +\infty)$

۳- الف) $y = \sqrt{2-[n]}$

$D_f = (-\infty, 3)$

$2-[n] \geq 0$
 $[n] \leq 2$

ب) $y = \frac{1}{\sqrt{2-[n]}}$

$2-[n] > 0$
 $[n] < 2$

$D_f = (-\infty, 2)$

۴- الف) $y = \sqrt{[n-\frac{1}{3}] + [n+\frac{1}{3}]}$

$D_f = [\frac{1}{3}, +\infty)$

$[n-\frac{1}{3}] + [n+\frac{1}{3}] \geq 0$

$[n-\frac{1}{3}] + [n-\frac{1}{3}+1] \geq 0 \Rightarrow 2[n-\frac{1}{3}] + 1 \geq 0 \Rightarrow [n-\frac{1}{3}] \geq -\frac{1}{2} \Rightarrow n-\frac{1}{3} \geq 0 \Rightarrow n \geq \frac{1}{3}$

ب) $y = \sqrt{[n-\frac{1}{3}] + [-n+\frac{1}{3}]}$

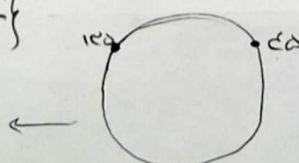
$[n-\frac{1}{3}] + [-n+\frac{1}{3}] \geq 0 \rightarrow [n-\frac{1}{3}] + [-(n-\frac{1}{3})] \geq 0 \xrightarrow{\text{if}} \begin{cases} a \in \mathbb{Z} & [a] + [-a] = 0 \\ a \notin \mathbb{Z} & [a] + [-a] = -1 \end{cases} \Rightarrow n-\frac{1}{3} \in \mathbb{Z}$
 $A = \{n/n = k + \frac{1}{3}, k \in \mathbb{Z}\}$

۵- الف) $y = \frac{r}{\sin n-1}$

$\sin n-1 \neq 0$
 $\sin n \neq 1$

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

ب) $y = \frac{r}{r \sin n-1}$



$r \sin n-1 \neq 0$
 $\sin n \neq \frac{1}{r} \Rightarrow \sin n \neq \frac{1}{\sqrt{r^2+1}} \Rightarrow \sin n \neq \frac{r}{\sqrt{r^2+1}}$

$D_f = \mathbb{R} - \{k\pi + \frac{\pi}{2}, k\pi + \frac{3\pi}{2}\}$

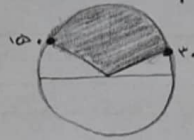
4- الف) $y = \sqrt{r \sin m - 1}$

$$\begin{aligned} r \sin m - 1 &\geq 0 \\ r \sin m &\geq \frac{1}{r} \end{aligned}$$

ب) $y = \sqrt{\cos m - 1}$

$$\begin{aligned} \cos m - 1 &\geq 0 \\ \cos m &\geq 1 \end{aligned}$$

$$D_f = \{2k\pi\}$$



$$D_f = \left[2k\pi + \frac{\pi}{4}, 2k\pi + \frac{5\pi}{4}\right]$$

5- الف) $\cos y = |n| - 3$

$$\begin{aligned} -1 &\leq |n| - 3 \leq 1 \\ 2 &\leq |n| \leq 4 \end{aligned}$$

$$D_f = \begin{cases} 2 \leq n \leq 4 \\ -2 \leq n \leq -4 \end{cases}$$

ب) $y = \arcsin(n^2 + 3n + 1)$

$$-1 \leq n^2 + 3n + 1 \leq 1$$

$$D_f = I \cap II \Rightarrow [-3, -1] \cup [1, 3]$$

$$\begin{cases} n^2 + 3n + 1 \leq 1 \Rightarrow n(n+3) \leq 0 \quad I \\ n^2 + 3n + 1 \geq -1 \Rightarrow n^2 + 3n + 2 \geq 0 \quad II \end{cases}$$

$$\frac{n}{n+3} \leq 0$$

$$\frac{n}{n+2} \geq 0$$

$$(n+1)(n+2)$$

$$D_f = (-\infty, -2] \cup [1, +\infty)$$

6- الف) $y = \sqrt{2 - \log_2(n-2)}$

$$2 - \log_2(n-2) \geq 0$$

$$\log_2(n-2) \leq 2 \Rightarrow n-2 \leq 4 \Rightarrow n \leq 6 \quad D_f = (-\infty, 6]$$

ب) $y = \log(n^3 - n)$

$$n^3 - n > 0$$

$$n(n-1)(n+1) > 0$$

$$\frac{n-1}{n+1} > 0$$

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

7- الف) $y = \frac{r}{e^n + 1}$

$$e^n + 1 \neq 0 \quad e^n \neq -1$$

$$D_f = \mathbb{R}$$

ب) $y = \frac{r}{e^n - 1}$

$$e^n - 1 \neq 0 \rightarrow e^n \neq 1 \rightarrow n \neq 0$$

$$D_f = \mathbb{R} - \{0\}$$

ج) $y = \frac{r}{e^n - 2}$

$$e^n - 2 \neq 0 \rightarrow e^n \neq 2 \rightarrow r^n \neq 2 \rightarrow n \neq \frac{1}{r}$$

$$D_f = \mathbb{R} - \left\{\frac{1}{r}\right\}$$

د) $y = \frac{r}{e^n - 3}$

$$\begin{aligned} e^n - 3 &\neq 0 \\ e^n &\neq 3 \end{aligned}$$

$$D_f = \mathbb{R} - \{\log_e 3\}$$

$$D_f = \mathbb{R} - \{\log_e 2\}$$

8- الف) $y = (n+1)!$

$$n+1 \in \mathbb{W}$$

$$n \in \mathbb{W} - 1 \Rightarrow n \in \frac{\mathbb{W}-1}{r} \rightarrow D_f = \left\{n/n = \frac{k-1}{r}, k \in \mathbb{W}\right\}$$

ب) $y = \left(\frac{r_n - r}{r_n - \alpha}\right)!$

$$\frac{r_n - r}{r_n - \alpha} \in \mathbb{W}$$

$$r_n - r \in \mathbb{W}(r_n - \alpha)$$

$$r_n - r \in r_n \mathbb{W} - \alpha \mathbb{W}$$

$$r_n - r - r_n \mathbb{W} \in -\alpha \mathbb{W} + r \rightarrow$$

$$D_f = \left\{n/n = \frac{-\alpha k + r}{r - rk}, k \in \mathbb{W}\right\}$$

$$n \in \frac{-\alpha \mathbb{W} + r}{r - r \mathbb{W}}$$