

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

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

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

✓

$\frac{n^2-n^2}{n^2-n} \geq 0$
 $\frac{0}{n(n-1)} \geq 0$

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

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

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

$D_f = (0, +\infty)$

ب) $y = \frac{1}{\sqrt{n+|n|}}$

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

✓

$D_f = (0, +\infty)$

۳- الف) $y = \sqrt{2-[n]}$

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

$D_f = (-\infty, 3)$

ب) $y = \frac{1}{\sqrt{2-[n]}}$

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

$D_f = (-\infty, 2)$

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

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

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

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

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

$[n-\frac{1}{p}] + [n+\frac{1}{p}] \geq 0 \rightarrow [n-\frac{1}{p}] + [-(n-\frac{1}{p})] \geq 0 \rightarrow$ if

$\begin{cases} a \in \mathbb{Z} & [a] + [-a] = 0 \\ a \notin \mathbb{Z} & [a] + [-a] = -1 \end{cases} \Rightarrow n-\frac{1}{p} \in \mathbb{Z}$

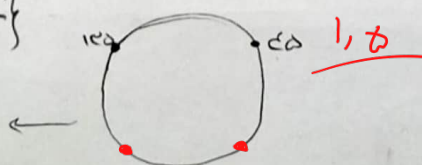
$A = \{n/n = k + \frac{1}{p}, k \in \mathbb{Z}\}$

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) $y = \frac{r}{r \sin n-1}$



$k\pi + \frac{\pi}{2}$

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

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

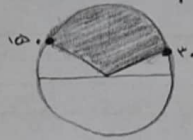
4- الف) $y = \sqrt{r \sin n - 1}$

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

ب) $y = \sqrt{\cos n - 1}$

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

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



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

(✓) ✓

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) $y = \arcsin(n^2 + 3n + 1)$

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

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

$$D_f = I \cap II \Rightarrow [-3, -1] \cup [0, 1]$$

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

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

6- الف) $y = \sqrt{2 - \log_2(n-2)}$

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

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

ب) $y = \log(n^2 - n)$

$$\begin{aligned} n^2 - n &> 0 \\ n(n-1)(n+1) &> 0 \end{aligned}$$

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

1, 0

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

7- الف) $y = \frac{r}{e^n + 1}$

$$e^n + 1 \neq 0 \Rightarrow e^n \neq -1 \Rightarrow D_f = \mathbb{R}$$

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) $y = \frac{r}{e^n - 2}$

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

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

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

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

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

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

$$r_n - r - a\mathbb{W} \in -a\mathbb{W} + r \Rightarrow$$

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

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