

1 **الف**) $\sqrt{\frac{x^2 - 4x}{x^3 - x}} = \frac{x(x-4)}{x(x^2-1)} = \frac{x(x-4)}{x(x-1)(x+1)} \geq 0$ (1)

3 $\frac{-1}{-} \frac{0}{+} \frac{1}{+} \frac{4}{-}$ $\rightarrow (-1, 1) \cup [4, +\infty)$

5 **ب**) $\sqrt{\frac{x^3 - x^2}{x^3 - x}} = \frac{x^2(x-1)}{x(x^2-1)} = \frac{x^2(x-1)(x+1)}{x(x-1)(x+1)} \geq 0$

7 $\frac{-1}{+} \frac{0}{+} \frac{1}{+}$ $\mathbb{R}$

9 **الف**) $y = \frac{x+1}{\sqrt{x+|x|}} \rightarrow x+|x| > 0 \rightarrow x > -|x|$ (2)

11 **ب**) $y = \frac{1}{\sqrt{x+|x|}} \rightarrow x+|x| > 0$ $\mathbb{R}^+$

13 **الف**) $y = \sqrt{2-[x]} \rightarrow 2-[x] \geq 0 \rightarrow [x] \leq 2 \rightarrow x < 3$ (3)

15 **ب**) $\frac{1}{\sqrt{2-[x]}} \rightarrow 2-[x] > 0 \rightarrow [x] < 2 \rightarrow x < 2$ $(-\infty, 2)$

17 **الف**) $y = \sqrt{[x - \frac{1}{x}] + [x + \frac{1}{x}]} \rightarrow [x - \frac{1}{x}] + [x + \frac{1}{x}] \geq 0$ (4)

18 $[x - \frac{1}{x} + 1] + [x + \frac{1}{x}] \geq 1 \rightarrow 2[x + \frac{1}{x}] \geq 1 \rightarrow [x + \frac{1}{x}] \geq \frac{1}{2}$

19 $[x + \frac{1}{x}] \geq 1 \rightarrow x + \frac{1}{x} \geq 1 \rightarrow x \geq \frac{1}{x} \rightarrow [\frac{1}{x}, +\infty)$

ب) $y = \sqrt{\left[n - \frac{1}{n}\right] + \left[-n + \frac{1}{n}\right]} \Rightarrow \left[n - \frac{1}{n}\right] + \left[-\left(n - \frac{1}{n}\right)\right] \geq 0$

if $a \in \mathbb{Z}$ $[a] + [-a] = 0$

if $a \notin \mathbb{Z}$ $[a] + [-a] = -1 \rightarrow n - \frac{1}{n} \in \mathbb{Z} \rightarrow D_f = \left\{n \mid n = k - \frac{1}{k}, k \in \mathbb{Z}\right\}$

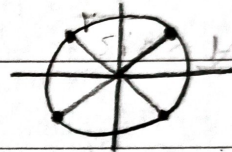
الف) $y = \frac{r}{\sin x - 1} \Rightarrow \sin x - 1 \neq 0 \rightarrow \sin x \neq 1$

$R = \left\{2k\pi + \frac{\pi}{2}\right\}$



ب) $y = \frac{r}{r \sin^2 x - 1} \rightarrow r \sin^2 x - 1 \neq 0 \rightarrow r \sin^2 x \neq 1 \rightarrow \sin^2 x \neq \frac{1}{r}$

$R = \left\{\frac{k\pi}{r} + \frac{\pi}{2}\right\}$



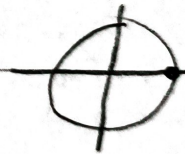
الف) $y = \sqrt{r \sin x - 1} \rightarrow r \sin x - 1 \geq 0 \rightarrow \sin x \geq \frac{1}{r}$

$\left[2k\pi + \frac{\pi}{2}, 2k\pi + \frac{\pi}{r}\right]$



ب) $y = \sqrt{\cos x - 1} \rightarrow \cos x - 1 \geq 0 \rightarrow \cos x \geq 1$

$[2k\pi, 2k\pi]$



$-1 \leq \cos y \leq 1$

الف) $\cos y = |x| - r \rightarrow -1 \leq |x| - r \leq 1 \rightarrow r \leq |x| \leq r+1$

$r \leq |x| \rightarrow x \geq r \cup x \leq -r \rightarrow (-\infty, -r] \cup [r, +\infty)$

$|x| \leq r+1 \rightarrow -r-1 \leq x \leq r+1 \rightarrow [-r-1, r+1]$

$\rightarrow [-r-1, -r] \cup [r, r+1]$

ب) $y = \arcsin(x^2 + 3x + 1) \rightarrow -1 \leq x^2 + 3x + 1 \leq 1$

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

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

دارم ص بد



$$\begin{array}{ccccccc} & -2 & & -1 & & & \\ & + & \phi & - & \phi & + & \\ & & & & & & \end{array} \quad (1)$$

$$\begin{array}{ccccccc} & -3 & & -2 & & & \\ & + & \phi & - & \phi & + & \\ & & & & & & \end{array} \quad (2)$$

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

$$(-\infty, -3] \cup [0, +\infty)$$

$$[-3, -2] \cup [-1, 0]$$

الف) $y = \sqrt{2 - \log_{\mu}(n-2)}$ ① $n-2 > 0 \rightarrow n > 2$

② $\log_{\mu}^{n-2} \leq 2 \rightarrow n-2 \leq 9 \rightarrow n \leq 11$

① و ② $n \rightarrow 2 < n \leq 11 \rightarrow (2, 11]$

ب) $y = \log(n^3 - n) \rightarrow n^3 - n > 0 \rightarrow n(n-1)(n+1) > 0$

$$\begin{array}{ccccccc} & -1 & & 0 & & 1 & \\ & + & - & * & + & * & - & * & + \\ & & & & & & & & \end{array} \rightarrow D_f = (-1, 0) \cup (1, +\infty)$$

ج) $y = \frac{3}{f^n + 1} \rightarrow f^n + 1 \neq 0 \rightarrow f^n \neq -1 \quad (R) \quad (1)$
مصارف برقرار

د) $y = \frac{3}{f^n - 1} \rightarrow f^n - 1 \neq 0 \rightarrow f^n \neq 1 \rightarrow n \neq 0 \rightarrow R - \{0\}$

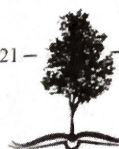
ه) $y = \frac{3}{f^n - 2} \rightarrow f^n - 2 \neq 0 \rightarrow f^n \neq 2 \rightarrow R - \{\log_f^{-2}\}$

و) $y = \frac{3}{f^n - 3} \rightarrow f^n - 3 \neq 0 \rightarrow f^n \neq 3 \rightarrow n \neq \log_f 3$
 $R - \{\log_f 3\}$

ز) $y = (f^{n+1})! \rightarrow f^{n+1} \in \mathbb{N} \rightarrow f^n \in \mathbb{N} - 1 \rightarrow n \in \frac{\mathbb{N}-1}{f} \quad (1.0)$

$D_f = \{n \mid n = \frac{k-1}{f}, k \in \mathbb{N}\}$

ح) $y = \left(\frac{f^{n-2}}{f^{n-5}}\right)! \rightarrow \frac{f^{n-2}}{f^{n-5}} \in \mathbb{N} \rightarrow \frac{-5\omega + 2}{2\omega - 3} = \frac{\omega - 2}{2\omega - 3}$



Senobar

$D_f = \{n \mid n = \frac{\omega k - 2}{2k - 3}, k \in \mathbb{N}\}$