

۲۰۰۰ نفر از دبیران عالی نوشتند

$$f(n) = \sqrt{(a-2)n^2 + an + b} \Rightarrow D_f = [3 + \infty)$$

$$a=2 \Rightarrow 2n+b \geq 0 \quad n \geq -\frac{b}{2} \Rightarrow -\frac{b}{2} \geq 3 \Rightarrow b \leq -6$$

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$$f(n) = \sqrt{n^2 + 2n + 2 - m^2} \Rightarrow D_f = \mathbb{R}$$

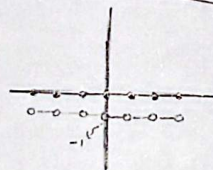
$$n^2 + 2n + 2 - m^2 \geq 0 \Rightarrow \Delta \leq 0 \Rightarrow 4 - 4 + 4m^2 \leq 0 \Rightarrow 4m^2 \leq 4 \Rightarrow m^2 \leq 1 \Rightarrow -1 \leq m \leq 1$$

$$1 - (-1) = 2$$

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$$f(n) = \frac{\sqrt{4 - n^2}}{[n] + [-n] + 1}$$

$$\begin{aligned} 4 - n^2 \geq 0 &\Rightarrow -2 \leq n \leq 2 \\ [n] + [-n] \neq -1 &\Rightarrow n \in \mathbb{Z} \end{aligned} \quad \left\{ \begin{aligned} &\{-2, -1, 0, 1, 2\} \\ &\text{عد } 5 \end{aligned} \right.$$



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$$\text{الف) } y = \sqrt{n^2 + 3n^2} \Rightarrow n^2 + 3n^2 \geq 0 \Rightarrow n^2(n+3) \geq 0$$

$$D_f = [-3, +\infty)$$

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

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

$$D_f = (-\infty, -1] \cup \{0\} \cup [3, +\infty)$$

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$$\text{الف) } y = \sqrt{|n-2| - 3}$$

$$|n-2| \geq 3 \Rightarrow n-2 \geq 3 \Rightarrow n \geq 5$$

$$n-2 \leq -3 \Rightarrow n \leq -1$$

$$D_f = \mathbb{R} - (-1, 5)$$

$$\text{ب) } y = \sqrt{f - |2-n|}$$

$$f - |2-n| \geq 0 \Rightarrow f \geq |2-n| \Rightarrow f \geq -n \Rightarrow -2 \leq n \leq 4$$

$$D_f = [-2, 4]$$

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$$\text{الف) } y = \sqrt{1 - \cos n}$$

$$1 \geq \cos n \Rightarrow 1 \geq n^2 \Rightarrow 0 \leq n^2 - 1 \Rightarrow \frac{-1}{+} \frac{1}{-} + \quad [0, 1] \text{ I}$$

$$\text{I} \cup \text{II} = \mathbb{R}_f = (-\infty, 1]$$

$$\Rightarrow 1 \geq -n^2 \Rightarrow n^2 + 1 \geq 0 \quad \mathbb{R} = (-\infty, \infty) \text{ II}$$

$$\text{ب) } y = \frac{1}{\sqrt{1 - \cos n} - 1}$$

$$1 \geq \cos n \Rightarrow 1 \geq 1 - \cos n \Rightarrow 1 \geq 1 - 1 \Rightarrow 1 \geq 0 \quad \mathbb{R}_f = [1, \infty) - \{1, 0\}$$

$$\sqrt{1 - \cos n} \neq 1 \Rightarrow 1 - \cos n + 1 \neq 1 \Rightarrow 1 - \cos n \neq 0 \Rightarrow \cos n \neq 1 \Rightarrow n \neq 2\pi$$

$$\text{الف) } y = \frac{\sin^2 n - 1}{\cos n}$$

$$\cos n \neq 0 \quad \text{Unit Circle}$$

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

$$\text{ب) } y = \frac{\cos n}{1 - \cos n}$$

$$\cos n \neq 1 \quad \text{Unit Circle}$$

$$\mathbb{R}_f = \mathbb{R} - \left\{2k\pi \pm \frac{\pi}{2}\right\}$$

$$\text{الف) } y = \frac{n+3}{|n+1| - |n+3|}$$

$$|n+1| \neq |n+3| \Rightarrow (n+1)^2 \neq (n+3)^2 \Rightarrow n^2 + 2n + 1 \neq n^2 + 6n + 9 \Rightarrow 2n + 1 \neq 6n + 9 \Rightarrow -4n \neq 8 \Rightarrow n \neq -2$$

$$\mathbb{R}_f = \mathbb{R} - \{-2\}$$

$$n \neq \frac{-3 \pm 10}{9} \Rightarrow n \neq \frac{7}{9}, \frac{-13}{9} \Rightarrow \frac{7}{9}, \frac{-13}{9}$$

$$\Delta = 81 - 4 \times 9 \times 10 = 81 - 360 = -279 < 0$$

$$\text{ب) } y = \sqrt{|n+1| - |n+3|}$$

$$|n+1| \geq |n+3| \Rightarrow (n+1)^2 \geq (n+3)^2 \Rightarrow n^2 + 2n + 1 \geq n^2 + 6n + 9 \Rightarrow -4n \geq 8 \Rightarrow n \leq -2$$

$$n^2 - n - 1 \geq 0 \Rightarrow (n + \frac{1}{2})^2 - \frac{5}{4} \geq 0 \Rightarrow \frac{-\frac{1}{2} \pm \sqrt{\frac{5}{4}}}{2} \Rightarrow \frac{-\frac{1}{2} \pm \frac{\sqrt{5}}{2}}{2} \Rightarrow \frac{-1 \pm \sqrt{5}}{4}$$

$$\mathbb{R}_f = (-\infty, \frac{-1 - \sqrt{5}}{4}] \cup [\frac{-1 + \sqrt{5}}{4}, \infty)$$

$$f(n) = \sqrt{\log_{\frac{1}{2}} \log_{\frac{1}{2}} (n-1)}$$

$$n-1 > 0 \Rightarrow n > 1$$

$$\log_{\frac{1}{2}} (n-1) > 0 \Rightarrow n-1 > 1 \Rightarrow n > 2$$

$$\log_{\frac{1}{2}} \log_{\frac{1}{2}} (n-1) \geq 0 \Rightarrow \log_{\frac{1}{2}} (n-1) \leq 1 \Rightarrow n-1 \leq 2 \Rightarrow n \leq 3$$

$$\mathbb{R}_f = (2, 3]$$

$$\text{الف) } y = \log(\cos n + 1)$$

$$\cos n + 1 > 0 \Rightarrow \cos n > -1$$

$$\mathbb{R}_f = (2k\pi - \frac{\pi}{2}, 2k\pi + \frac{\pi}{2})$$



$$\text{ب) } \sqrt{\log \frac{n-1}{n+1}}$$

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

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

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

$$\mathbb{R}_f = (-\infty, -1)$$