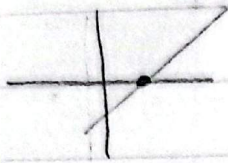


$$f_n = \sqrt{(a-r)n^2 + an + b} \quad [r, +\infty)$$

(1)



$$a = r \quad \text{from } \sqrt{rn + b} \rightarrow n = r \rightarrow r + b = 0 \rightarrow b = -r$$

$$f(n) = \sqrt{n^2 + 2n + r} \rightarrow \Delta \leq 0 \rightarrow r - 4(1-r) \leq 0 \rightarrow r - 4 + 4r \leq 0$$

(2)

$$\rightarrow 5r - 4 \leq 0 \rightarrow r(m^2 - 1) \leq 0 \rightarrow r(m+1)(m-1) \leq 0$$

$$\rightarrow r \quad [-1, 1] \rightarrow 1 - (-1) = 2$$

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

$$\rightarrow r - n^2 \geq 0 \rightarrow (r-n)(r+n) \geq 0$$

(3)

$$\rightarrow [n] + [-n] + 1 \neq 0 \rightarrow [n] + [-n] \neq -1 \rightarrow n \notin \mathbb{Z}$$

$$\rightarrow P_f = \{-2, -1, 0, 1, 2\} \rightarrow \text{مربع کی صورت}$$

$$\text{ان) } y = \sqrt{n^2 + rn} = \sqrt{n(n+r)}$$

$$\rightarrow n^2(n+r) \geq 0 \rightarrow \frac{-r}{-1} \leq n \leq \frac{r}{1} \rightarrow P_f = [-r, r]$$

(4)

$$\therefore y = \sqrt{\frac{(n^2-1)(n^2-rn^2)}{n^2-1}} = \sqrt{\frac{(n-1)(n+1)n^2(n-r)}{(n-1)(n^2+1+n)}} \rightarrow \frac{n(n-1)(n+1)(n-r)}{(n-1)(n^2+1+n)} \geq 0$$

$$\rightarrow n \neq 0 \quad n = 1 \quad n = -1 \quad n = r \rightarrow P_f = (-\infty, -1] \cup [r, +\infty) \cup \{0\}$$

$$\text{ان) } y = \sqrt{|n-r|r} \rightarrow |n-r|r \geq 0 \rightarrow |n-r| \geq r \rightarrow n-1 \geq r \rightarrow n \geq 1$$

(5)

$$\rightarrow P_f = (-\infty, -1] \cup [r, +\infty)$$

$$\therefore y = \sqrt{r-|r-n|} \rightarrow r-|r-n| \geq 0 \rightarrow |r-n| \leq r \rightarrow r-n \leq r \rightarrow n \geq -r$$

$$\rightarrow P_f = [-r, r]$$

$\therefore y = \sqrt{1-n/n} \xrightarrow{\text{domain}} \begin{cases} n > 0 \rightarrow 1-n^2 \\ n = 0 \rightarrow 1 \\ n < 0 \rightarrow 1-n^2 \end{cases} \rightarrow \text{graph} \rightarrow D_f = (-\infty, 1] \quad (9)$

$\therefore y = \frac{1}{\sqrt{r-|n-\omega|}-1} \rightarrow r-|n-\omega| \geq 0 \rightarrow |n-\omega| \leq r \rightarrow -r \leq n-\omega \leq r \rightarrow r \leq n \leq 1$
 $\rightarrow \sqrt{r-|n-\omega|}-1 \neq 0 \rightarrow \sqrt{r-|n-\omega|} \neq 1 \rightarrow r-|n-\omega| \neq 1$
 $\rightarrow |n-\omega| \neq r \rightarrow n-\omega \neq r \rightarrow n \neq r+\omega$
 $\rightarrow n-\omega \neq -r \rightarrow n \neq -r+\omega$
 $\rightarrow D_f = [r, 1] - \{r, -r\}$

$\therefore y = \frac{\sin^n x - 1}{\cos x} \rightarrow \cos x \neq 0 \rightarrow \text{graph} \rightarrow D_f = \mathbb{R} - \left\{k\pi + \frac{\pi}{2}\right\} \quad (10)$

$\therefore y = \frac{\cos x}{r \cos x - 1} \rightarrow (r \cos x - 1) \neq 0 \rightarrow r \cos x \neq 1 \rightarrow \cos x \neq \frac{1}{r} \rightarrow \text{graph}$
 $\rightarrow D_f = \mathbb{R} - \left\{k\pi \pm \frac{\pi}{r}\right\}$

$\therefore y = \frac{n+r}{|r n + 1| - |n+r|} \rightarrow |r n + 1| - |n+r| \neq 0 \rightarrow (|r n + 1|) \neq (|n+r|) \quad (11)$

$\rightarrow (r n + 1) + (n+r) \neq (r n + 1) - (n+r) \rightarrow r n^2 - r n - 1 \neq 0$
 $\rightarrow r n^2 - r n - 1 \neq 0 \rightarrow (n-4)(n+1) \neq 0 \rightarrow n \neq \frac{4}{r} \rightarrow n \neq -\frac{1}{r}$

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

$\therefore y = \sqrt{|r n + 1| - |n+r|}$

$\rightarrow |r n + 1| - |n+r| \geq 0 \rightarrow |r n + 1| \geq |n+r|$

$\rightarrow (r n + 1) + (n+r) \geq (r n + 1) - (n+r) \rightarrow r n^2 - r n - 1 \geq 0 \rightarrow r n^2 - r n - 1 \geq 0$

$\rightarrow (n-4)(n+1) \geq 0 \rightarrow \frac{-\frac{1}{r} \pm \sqrt{\frac{1}{r^2} + 4}}{2} \rightarrow D_f = (-\infty, -\frac{1}{r}] \cup [\frac{4}{r}, \infty)$

9

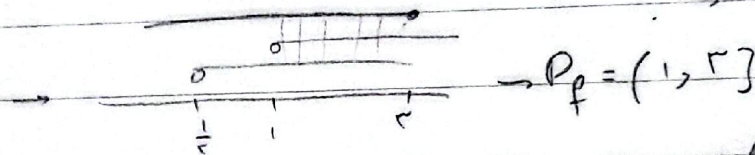
$$f(n) = \sqrt{\log_{\frac{1}{2}} \log_a^{(r_{n-1})}}$$

$$\rightarrow r_{n-1} > 0 \rightarrow r_n > 1 \rightarrow n > \frac{1}{r}$$

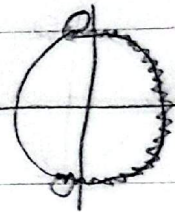
$$\rightarrow \log_{\frac{1}{2}}^{r_{n-1}} > 0 \rightarrow r_{n-1} > 1 \rightarrow r_n > 2 \rightarrow n > 1$$

$$\log_{\frac{1}{2}}^{r_{n-1}} \geq 0 \rightarrow \log_0^{r_{n-1}} < 1 \rightarrow r_{n-1} \leq 0 \rightarrow r_n \leq 1$$

$$\rightarrow n \leq r$$



$$\text{ii) } y = \log(r \cos n + 1) \rightarrow r \cos n + 1 > 0 \rightarrow r \cos n > -1/r \rightarrow$$



10

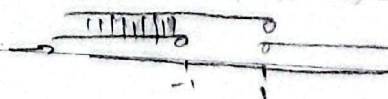
$$\rightarrow P_f = (r \cos n - \frac{1}{r}, r \cos n + \frac{1}{r})$$

$$\text{iii) } y = \sqrt{\log \frac{n-1}{n+1}}$$

$$\rightarrow \frac{n-1}{n+1} > 0 \rightarrow \frac{-1}{+} - \frac{1}{+} \rightarrow (-\infty, -1) \cup (1, +\infty)$$

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

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



$$\rightarrow P_f = (-\infty, -1)$$