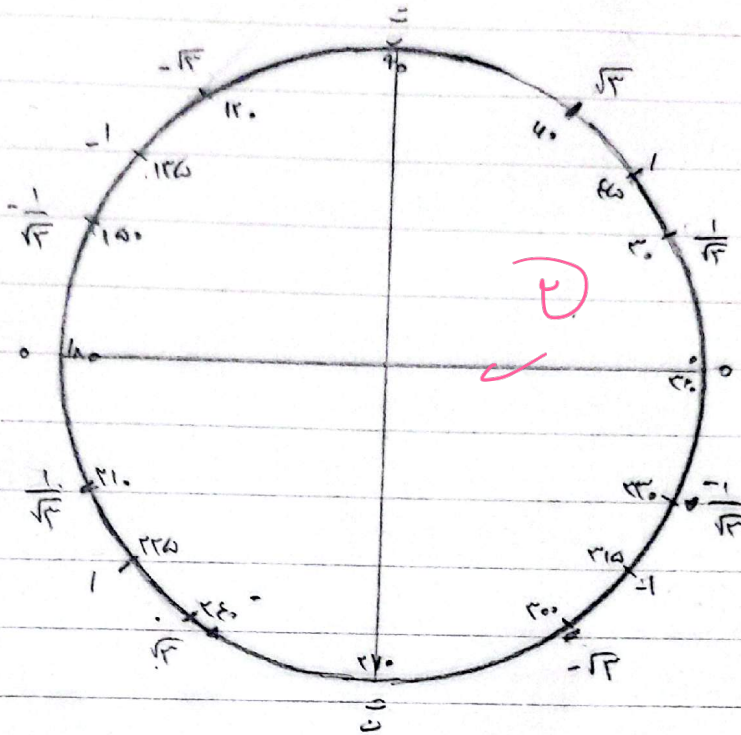




①

$$a) \sin \frac{\pi}{2} + \cos \pi + 2 \tan \frac{\pi}{4} = \frac{1}{1} + (-1) + 2(1) = 1 - 1 + 2 = 2$$

②

$$b) -\cos \frac{\pi}{2} + \sin \frac{\pi}{4} - 3 \sin \frac{\pi}{4} = \frac{1}{1} + \frac{\sqrt{2}}{2} - 3 \frac{\sqrt{2}}{2} = 1 - \sqrt{2}$$

$$c) \cot \frac{\pi}{4} + 2 \cot \frac{\pi}{4} - 3 \tan \frac{\pi}{4} = \frac{1}{1} + 2 \frac{1}{1} - 3(1) = 1 + 2 - 3 = 0$$

$$d) \cos \left(\frac{1}{2} \pi \right) + \sin \left(\pi \cos \frac{\pi}{4} \right) = \cos \left(\frac{1}{2} \pi \right) + \sin \left(\pi \frac{\sqrt{2}}{2} \right) = 0 + 0 = 0$$

③

$$f(n) = \begin{cases} n^2 + 2n & n \geq 1 \\ 2n + 1 & n \leq 0 \end{cases}$$

$$n=1 \rightarrow a^2 + 2a = 1 + 2 = 3 \rightarrow a^2 + a - 2 = 0 \rightarrow (a+2)(a-1) = 0$$

$$a=1 \rightarrow f(1) = 1 + 2 = 3$$

④

⑤

$$1, a+b$$

$$f_n = \begin{cases} 2n^2 - b & |n+1| \geq 2 \rightarrow n+1 \geq 2 \rightarrow n \geq 1 \\ a, 1n & -2 \leq n \leq 1 \rightarrow n+1 \leq -2 \rightarrow n \leq -3 \end{cases} \quad \left. \begin{matrix} n \leq -3 \\ n \geq 1 \end{matrix} \right\} \quad \textcircled{F}$$

$$n=1 \rightarrow 2-b = a+1 \rightarrow a+b=0$$

$$n=-3 \rightarrow 12-b = a+9 \rightarrow a+b=24 \quad \textcircled{D}$$

$$\text{مثال) } y = \frac{1}{2n^2 - 5n^2} \rightarrow 2n^2 - 5n^2 \neq 0 \rightarrow n^2(n-3) \neq 0 \rightarrow \left. \begin{matrix} n \neq 0 \\ n \neq 3 \end{matrix} \right\} D_f = \mathbb{R} - \{0, 3\} \quad \textcircled{A}$$

$$\text{مثال) } y = \frac{1}{2n^2 + 5n^2 + 2n + 5} = \frac{1}{2n^2 + 5n^2 + 2n + 5} = \frac{1}{2n(n^2+1) + 2(n^2+1)} = \frac{1}{(n^2+1)(2n+2)} \rightarrow (n^2+1)(2n+2) \neq 0$$

$$\rightarrow 2n+2 \neq 0$$

$$\rightarrow 2n \neq -2$$

$$\rightarrow n \neq -1$$

$$\rightarrow D_f = \mathbb{R} - \{-1\} \quad \textcircled{D}$$

$$\text{مثال) } y = \sqrt{n^2-1} + \sqrt{n-2} \rightarrow n^2-1 \geq 0 \rightarrow (n-1)(n+1) \geq 0 \rightarrow \frac{1}{+} \frac{1}{+} \frac{1}{+}$$

$$\rightarrow (-\infty, -1] \cup [1, +\infty) \quad (I)$$

$$n-2 \geq 0 \rightarrow n \geq 2 \quad (II)$$

$$\rightarrow (I) \cap (II) = [2, +\infty) = D_f \quad \textcircled{D}$$

$$\text{مثال) } y = \frac{\sqrt{4-5n}}{\sqrt{4n-5}} \rightarrow \begin{cases} 4-5n \geq 0 \rightarrow 4 \geq 5n \rightarrow n \leq \frac{4}{5} \quad (I) \\ 4n-5 \geq 0 \rightarrow 4n \geq 5 \rightarrow 2n \geq \frac{5}{2} \rightarrow n \geq \frac{5}{4} \quad (II) \end{cases}$$

$$D_f = (I) \cap (II) = \left(\frac{5}{4}, \frac{4}{5}\right]$$

$$y = \sqrt{4n-a} + \sqrt{b-5n} \rightarrow \begin{cases} b-5n \geq 0 \rightarrow b \geq 5n \rightarrow b \geq 5 \quad (I) \\ 4n-a \geq 0 \rightarrow 4n \geq a \rightarrow n \geq \frac{a}{4} \quad (II) \end{cases}$$

$$D_f = \left\{ \frac{4}{5} \right\} \rightarrow \frac{a}{4} = \frac{b}{5} \rightarrow \frac{b}{a} = \frac{5}{4} = \frac{1}{\frac{4}{5}} \quad \textcircled{D}$$

$$\text{مثال) } \begin{cases} 4n-a \geq 0 \rightarrow 4n \geq a \rightarrow n \geq \frac{a}{4} \\ b-5n \geq 0 \rightarrow b \geq 5n \rightarrow n \leq \frac{b}{5} \end{cases} \rightarrow \frac{a}{4} = \frac{b}{5} \rightarrow \frac{b}{a} = \frac{5}{4} = \frac{1}{\frac{4}{5}}$$

آفرین آفرین!

$$i) y = \sqrt{\frac{x^2 - x - 6}{x^2 - 15x^2 + 14}}$$

$$x^2 - x - 6 = 0 \rightarrow (x-3)(x+2) = 0 \rightarrow x=3 \quad x=-2 \quad \textcircled{A}$$

$$x^2 = 15x^2 + 14 \rightarrow (1-15)x^2 = 14 \rightarrow (-14)x^2 = 14 \rightarrow x^2 = -1 \rightarrow x = \pm i$$

$$x^2 = 1 \rightarrow x=1 \quad x=-1$$

$$\frac{x^2 - x - 6}{x^2 - 15x^2 + 14} = \frac{(x-3)(x+2)}{(1-15)x^2 + 14}$$

$$\rightarrow (-\infty, -2) \cup (2, \infty) - \{3\} = D_f$$

$$ii) y = \sqrt{\frac{x^2 - 2x^2 - 6x + 9}{x^2 + 5x^2 - 6x - 6}} = \sqrt{\frac{(x-1)(x+3)(x-3)}{(x+1)(x+5)(x-2)}} \quad x=1, -1, 3, -3, 2, -2$$

$$\begin{array}{r} x^2 - 2x^2 - 6x + 9 \quad | \quad x-1 \\ \underline{-x^2 - 6x + 9} \\ -x^2 - 6x + 9 \\ \underline{-x^2 - 6x + 9} \\ 0 \end{array} \quad \begin{array}{r} x^2 - 2x^2 - 6x + 9 \quad | \quad x+1 \\ \underline{-x^2 - 6x + 9} \\ -x^2 - 6x + 9 \\ \underline{-x^2 - 6x + 9} \\ 0 \end{array}$$

$$\begin{array}{r} x^2 + 5x^2 - 6x - 6 \quad | \quad x+1 \\ \underline{x^2 + 5x^2 - 6x - 6} \\ -x^2 - 6x - 6 \\ \underline{-x^2 - 6x - 6} \\ 0 \end{array}$$

$$\rightarrow \frac{x^2 - x - 6}{x^2 - 15x^2 + 14} \rightarrow D_f = (-\infty, -2) \cup (-1, 1) \cup (1, 2) \cup (2, \infty)$$

$$iii) y = \sqrt{x[n] - 4} \rightarrow x[n] - 4 \geq 0 \rightarrow [n] - 4 \geq 0 \rightarrow [n] \geq 4 \rightarrow D_f = [4, \infty) \quad \textcircled{9}$$

$$iv) y = \sqrt{x[n] - 6} \rightarrow x[n] - 6 \geq 0 \rightarrow x[n] \geq 6 \rightarrow [n] \geq 6 \rightarrow D_f = [6, \infty)$$

$$v) y = \sqrt{\frac{n+1}{n^2 + 15n + 6}} + \sqrt{\frac{4-n}{n^2 + 15n + 6}} \rightarrow \begin{cases} n+1 \geq 0 \rightarrow n \geq -1 \\ 4-n \geq 0 \rightarrow n \leq 4 \end{cases} \Rightarrow D_f = [-1, 4] - \{3\} \quad \textcircled{10}$$

$$\Delta = 15^2 - 4 = 225 - 4 = 221 \rightarrow \pm \sqrt{221}$$

$$vi) y = \sqrt{[n] - 4} + \sqrt{4 - [n]} \rightarrow \begin{cases} [n] - 4 \geq 0 \rightarrow [n] \geq 4 \rightarrow (4, \infty) \quad (1) \\ 4 - [n] \geq 0 \rightarrow [n] \leq 4 \rightarrow (-\infty, 4) \quad (2) \end{cases}$$

$$\rightarrow D_f = (1) \cap (2) = \emptyset$$