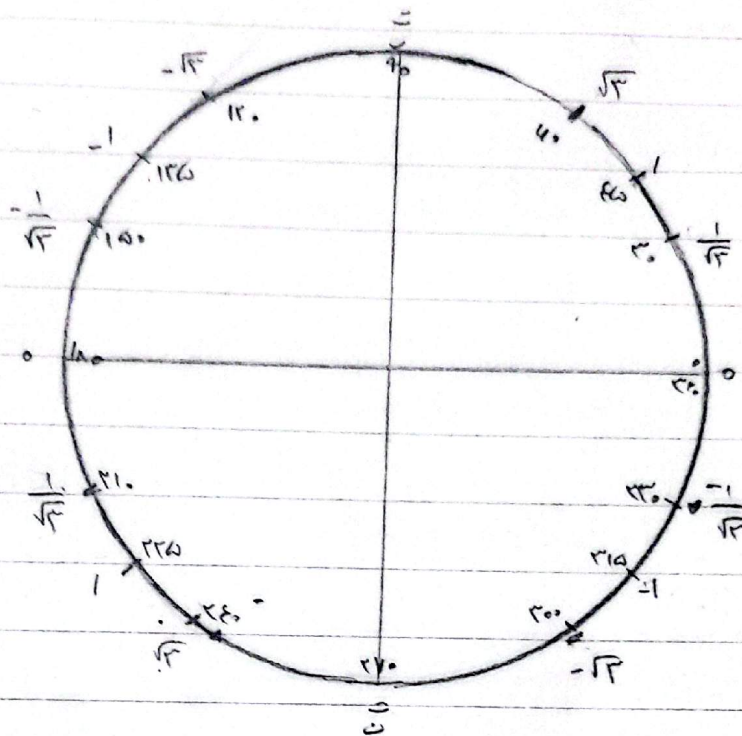


①



②

$$a) \sin \frac{\pi}{2} + \cos \pi + 2 \tan \frac{\pi}{2} = \frac{1}{1} + (-1) + 2(\infty) = \frac{1}{1} - \frac{1}{1} = \frac{0}{1}$$

$$b) -\cos \frac{\pi}{2} + \sin \frac{\pi}{2} - 3 \sin \frac{\pi}{2} = \frac{\sqrt{1}}{1} + \frac{\sqrt{1}}{1} - \frac{3\sqrt{1}}{1} = \frac{0\sqrt{1}}{1}$$

$$c) \cot \frac{\pi}{2} + 2 \cot \frac{\pi}{2} - 5 \tan \frac{\pi}{2} = -\frac{1}{\sqrt{1}} + \frac{2}{\sqrt{1}} - \frac{5}{\sqrt{1}} = \frac{1}{\sqrt{1}} - \frac{3}{\sqrt{1}} = \frac{-2\sqrt{1}}{1}$$

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

③

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

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

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

$$1, a+b$$

$$f_n = \begin{cases} \sqrt{n^2-b} & |n+1| \geq r \rightarrow n+1 \geq r \rightarrow n \geq 1 \\ a, r, n & -r \leq n \leq 1 \end{cases} \rightarrow \begin{cases} n \leq -r & n \geq 1 \end{cases} \quad (F)$$

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

$$n=-r \rightarrow r-b = a-r \rightarrow a+b=r^2$$

$$ii) y = \frac{1}{n^r - \sqrt{n^r}} \rightarrow n^r - \sqrt{n^r} \neq 0 \rightarrow n^r(n - \frac{1}{n}) \neq 0 \rightarrow \begin{cases} n \neq 0 \\ n \neq \frac{1}{n} \end{cases} \rightarrow D_f = \mathbb{R} - \{0, \frac{1}{n}\} \quad (A)$$

$$iii) y = \frac{1}{\sqrt{n^r} + \sqrt{n^r} + \sqrt{n} + r} = \frac{1}{\sqrt{n^r} + \sqrt{n} + \sqrt{n^r} + r} = \frac{1}{\sqrt{n}(\sqrt{n^r+1}) + \sqrt{n}(\sqrt{n^r+1})} = \frac{1}{(\sqrt{n^r+1})(\sqrt{n} + \sqrt{n})} \rightarrow \begin{aligned} &(\sqrt{n^r+1})(\sqrt{n} + \sqrt{n}) \neq 0 \\ &\rightarrow \sqrt{n} + \sqrt{n} \neq 0 \\ &\rightarrow \sqrt{n} \neq -\sqrt{n} \\ &\rightarrow n \neq -\frac{r}{r} = -r \end{aligned}$$

$$\rightarrow D_f = \mathbb{R} - \{-r\}$$

$$ii) y = \sqrt{n^r-1} + \sqrt{n-r} \rightarrow \begin{aligned} &n^r-1 \geq 0 \rightarrow (n-1)(n+1) \geq 0 \rightarrow \frac{1}{n-1} + \frac{1}{n+1} \geq 0 \\ &\rightarrow (-\infty, -1] \cup [1, +\infty) \quad (I) \\ &n-r \geq 0 \rightarrow n \geq r \quad (II) \end{aligned} \quad (C)$$

$$\rightarrow (I) \cap (II) = [r, +\infty) = D_f$$

$$iii) y = \frac{\sqrt{4-rn}}{\sqrt{4rn}} \rightarrow \begin{aligned} &4-rn \geq 0 \rightarrow \frac{r}{4} \geq rn \rightarrow n \leq \frac{r}{4} \quad (I) \\ &4rn \geq 0 \rightarrow \frac{r}{4} \geq rn \rightarrow rn \geq 1 \rightarrow n \geq \frac{1}{r} \quad (II) \end{aligned} \quad (D)$$

$$D_f = (D) \cap (II) = [\frac{1}{r}, \frac{r}{4}]$$

$$y = \sqrt{4n-a} + \sqrt{b-5n} \rightarrow \begin{aligned} &b \cdot 0^2 = 0 \rightarrow b=9 \\ &\frac{b}{a} = \frac{1}{r} \end{aligned} \quad (V)$$

$$D_f = \{r\} \rightarrow \begin{aligned} &15-a=0 \rightarrow a=15 \end{aligned}$$

$$ii) : \begin{aligned} &4n-a \geq 0 \rightarrow 4n \geq a \rightarrow n \geq \frac{a}{4} \\ &b-5n \geq 0 \rightarrow b \geq 5n \rightarrow n \leq \frac{b}{5} \end{aligned} \rightarrow \begin{cases} \frac{a}{4} = \frac{b}{5} \rightarrow \frac{b}{a} = \frac{5}{4} = \frac{1}{r} \end{cases} \rightarrow \boxed{\frac{1}{r}}$$

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

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

$$x^2 \rightarrow x^2 - 15x^2 + 14 = 0 \rightarrow (x-1)(x-14) = 0 \rightarrow x=1 \rightarrow x=14 \quad x=-14$$

$$x^2 = 14 \rightarrow x=14 \quad x=-14$$

$$\frac{x-3}{x-1} \cdot \frac{x+2}{x-14}$$

$$\rightarrow (-\infty, -14) \cup (1, 14) - \{3\} = D_f$$

$$ii) y = \sqrt{\frac{x^2 - 2x^2 - 6x + 9}{x^2 + 5x^2 - 6x - 6}}$$

$$= \sqrt{\frac{(x-1)(x-3)(x+3)}{(x+1)(x+3)(x-2)}}$$

$$x=1, -1, 3, -3, 2, -2$$

$$\begin{array}{r} x^2 - 2x^2 - 6x + 9 \quad | \quad x-1 \\ \underline{-x^2 - 6x + 9} \\ -x^2 - 6x + 9 \\ \underline{+x^2 + x} \\ -5x + 9 \\ \underline{+5x + 5} \\ 4 \end{array}$$

$$\begin{array}{r} x^2 + 5x^2 - 6x - 6 \quad | \quad x+1 \\ \underline{-4x^2 - 6x - 6} \\ -4x^2 - 6x - 6 \\ \underline{+4x^2 + 4x} \\ -2x - 6 \\ \underline{+2x + 2} \\ -4 \end{array}$$

$$\rightarrow \frac{x-3}{x-1} \cdot \frac{x+2}{x-14} \rightarrow D_f = (-\infty, -14) \cup [-2, -1) \cup [1, 2) \cup [2, +\infty)$$

$$iii) y = \sqrt{2[n] - 4} \rightarrow 2[n] - 4 \geq 0 \rightarrow [n] - 2 \geq 0 \rightarrow [n] \geq 2 \rightarrow D_f = [2, +\infty) \quad \textcircled{9}$$

$$iv) y = \sqrt{2[n] - 6} \rightarrow 2[n] - 6 \geq 0 \rightarrow 2[n] \geq 6 \rightarrow [n] \geq 3 \rightarrow D_f = [3, +\infty)$$

$$v) y = \sqrt{\frac{n+1}{n^2+1}} + \sqrt{\frac{4-n}{n^2+5n+6}} \rightarrow \begin{cases} n+1 \geq 0 \rightarrow n \geq -1 \\ 4-n \geq 0 \rightarrow n \leq 4 \end{cases} \Rightarrow D_f = [-1, 4] - \{-2\} \quad \textcircled{10}$$

$$\Delta = 5 - 12 = -12 \rightarrow +, -$$

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