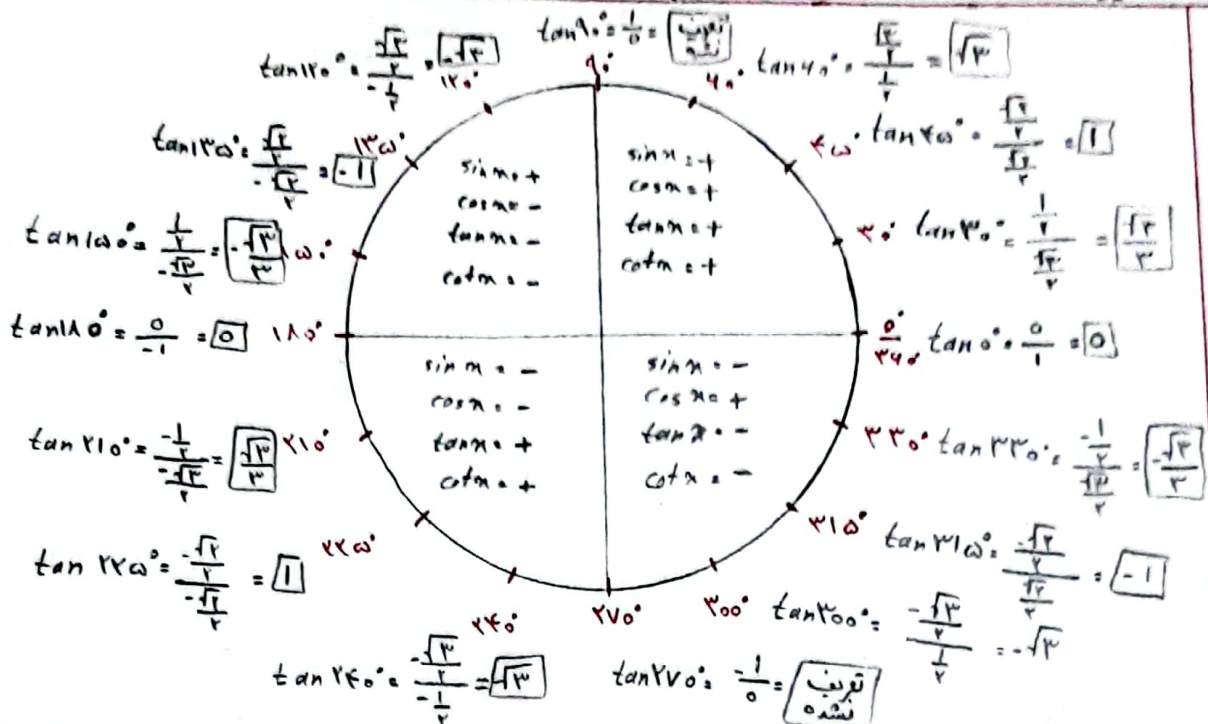




1

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

ب) $-\cos \frac{\pi}{4} + \sin \frac{2\pi}{3} - 2 \sin \frac{5\pi}{3} = -\frac{\sqrt{2}}{2} + \frac{\sqrt{3}}{2} - 2(-\frac{\sqrt{3}}{2}) = -\frac{\sqrt{2}}{2} + \frac{\sqrt{3}}{2} + \sqrt{3} = \frac{-\sqrt{2} + 3\sqrt{3}}{2}$

ج) $\cot \frac{2\pi}{3} + 2 \cot \frac{5\pi}{3} - 4 \tan \frac{\pi}{4} = -\frac{\sqrt{3}}{2} + 2 \cdot \frac{1}{\sqrt{3}} - 4(1) = -\frac{\sqrt{3}}{2} + \frac{2}{\sqrt{3}} - 4 = \frac{-\sqrt{3} + 4 - 8\sqrt{3}}{2} = \frac{4 - 9\sqrt{3}}{2}$

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

2

$f(1) = ?$

$f(x) = \begin{cases} x^2 + 5x & x \geq a \\ 2x + a + 2 & x < a \end{cases}$

از طریق ضابطه یابی: $a^2 + 5a = 2a + a + 2 \Rightarrow a^2 + 4a - 2 = 0$

از طریق ضابطه یابی: $a^2 + 5a = 2a + a + 2 \Rightarrow a^2 + 4a - 2 = 0$

از طریق ضابطه یابی: $a^2 + 5a = 2a + a + 2 \Rightarrow a^2 + 4a - 2 = 0$

از طریق ضابطه یابی: $a^2 + 5a = 2a + a + 2 \Rightarrow a^2 + 4a - 2 = 0$

3

$f(n) = \begin{cases} 2n^2 - 6 & |n+1| \geq 2 \\ a + 2n & -3 \leq n \leq -1 \end{cases}$

$f(n) = \begin{cases} 2n^2 - 6 & n \geq 1, n \leq -3 \\ a + 2n & -3 \leq n \leq -1 \end{cases}$

از طریق ضابطه یابی: $2(-3)^2 - 6 = a + 2(-3) \Rightarrow 6 = a - 6 \Rightarrow a = 12$

4

الف) $y = \frac{1}{x^3 - 6x^2} \Rightarrow x^3 - 6x^2 \neq 0 \Rightarrow x^2(x - 6) \neq 0 \Rightarrow x \neq 0, 6$

ب) $y = \frac{1}{2x^3 + 5x^2 + 2x + 2} \Rightarrow 2x^3 + 5x^2 + 2x + 2 \neq 0 \Rightarrow (x+2)(2x^2 + x + 1) \neq 0 \Rightarrow x \neq -2$

5

$$\text{الف) } y = \sqrt{x^2-1} + \sqrt{x-2} \Rightarrow \begin{cases} \text{I) } x^2-1 \geq 0 \Rightarrow (x-1)(x+1) \geq 0 \\ \text{II) } x-2 \geq 0 \Rightarrow x \geq 2 \end{cases}$$

$$\text{I} \cap \text{II} \rightarrow D_f = [2, +\infty)$$

$$\text{ب) } \frac{\sqrt{4-3x}}{\sqrt{4x-3}} \Rightarrow \begin{cases} \text{I) } 4-3x \geq 0 \Rightarrow 3x \leq 4 \Rightarrow x \leq \frac{4}{3} \\ \text{II) } 4x-3 \geq 0 \Rightarrow 4x \geq 3 \Rightarrow x \geq \frac{3}{4} \end{cases} \xrightarrow{\text{I} \cap \text{II}} D_f = \left[\frac{3}{4}, \frac{4}{3}\right]$$

$$y = \sqrt{4x-a} + \sqrt{b-3x} \quad D_f = \{x\} \quad \frac{b}{a} = ? \Rightarrow \frac{4}{12} = \left[\frac{1}{3}\right] \text{ جواب}$$

$$\begin{cases} 4x-a \geq 0 \Rightarrow 4x \geq a \Rightarrow x \geq \frac{a}{4} \Rightarrow \frac{a}{4} = 2 \Rightarrow a = 8 \\ b-3x \geq 0 \Rightarrow 3x \leq b \Rightarrow x \leq \frac{b}{3} \Rightarrow \frac{b}{3} = 2 \Rightarrow b = 6 \end{cases}$$

$$\text{الف) } y = \sqrt{x[n]-5} \Rightarrow x[n]-5 \geq 0 \Rightarrow x[n] \geq 5 \Rightarrow [n] \geq 2 \Rightarrow D_f = [2, +\infty)$$

$$\text{ب) } y = \sqrt{x[n]-a} \Rightarrow x[n]-a \geq 0 \Rightarrow x[n] \geq a \Rightarrow [n] \geq 2, a \quad D_f = [2, +\infty)$$

$$\text{الف) } y = \sqrt{\frac{x^2-x-4}{x^2-13x^2+34}} \Rightarrow \frac{x^2-x-4}{x^2-13x^2+34} \geq 0 \Rightarrow \frac{(x+2)(x-3)}{(x-9)(x-4)} \geq 0$$

$$x^2 = t \Rightarrow t^2 - 13t + 34 \geq 0 \quad x^2 = 9 \Rightarrow x = \pm 3$$

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

$$\text{ب) } y = \sqrt{\frac{x^3-2x^2+5x+4}{x^3+2x^2-5x-4}} \Rightarrow \frac{x^3-2x^2+5x+4}{x^3+2x^2-5x-4} \geq 0$$

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

$$D_f = (-\infty, -3) \cup [-2, -1) \cup [1, 2) \cup [3, +\infty)$$

$$\text{الف) } y = \sqrt{\frac{x+1}{1x-3}} + \sqrt{\frac{4-x}{x^2+2x+5}} \Rightarrow \frac{x+1}{1x-3} \geq 0 \Rightarrow \frac{-1}{x-3} \geq 0 \Rightarrow (-\infty, -1) \cup (3, +\infty)$$

$$\frac{4-x}{x^2+2x+5} \geq 0 \Rightarrow \frac{4-x}{(x+1)^2} \geq 0 \Rightarrow \frac{-1}{x+1} \geq 0 \Rightarrow (-\infty, -2) \cup (-2, 4]$$

$$\text{I} \cap \text{II} \rightarrow D_f = (-2, -1) \cup (3, 4]$$

$$\text{ب) } y = \sqrt{[n] - \epsilon} + \sqrt{r - [n]} \quad \left\{ \begin{array}{l} [n] - \epsilon \geq 0 \leadsto [n] \geq \epsilon \leadsto \textcircled{I} [\epsilon, +\infty) \\ r - [n] \geq 0 \leadsto [n] \leq r \leadsto \textcircled{II} (-\infty, r] \end{array} \right.$$

$$\frac{I \cap II}{\longrightarrow} D_f = \emptyset$$

10