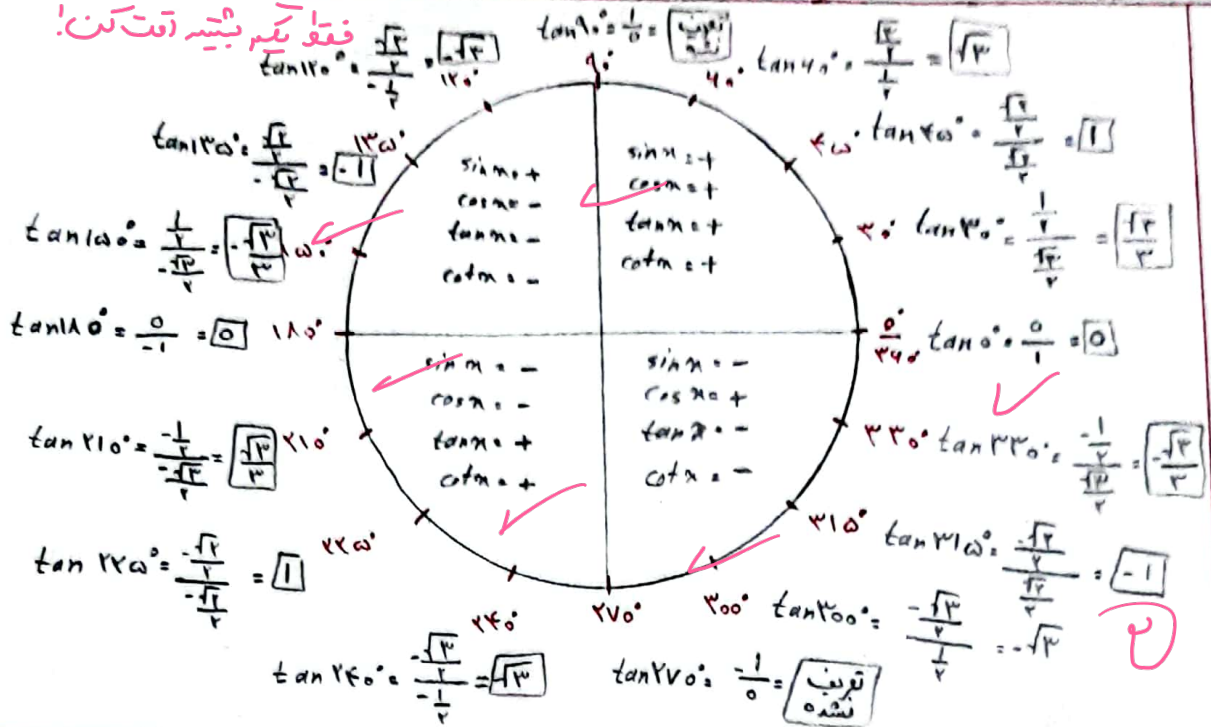


فقط یک بیت آت تن!



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

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

ج) $\cot \frac{2\pi}{3} + 2 \cot \frac{5\pi}{3} - 4 \tan \frac{2\pi}{4} = -\frac{\sqrt{3}}{2} + 2 \cdot \frac{1}{\sqrt{3}} - 4(1) = -\frac{\sqrt{3}}{2} + \frac{2}{\sqrt{3}} - 4 = \frac{-\sqrt{3} + 4 - 8\sqrt{3}}{2} = \frac{-7\sqrt{3} + 4}{2}$

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

$f(1) = ?$ $\cos \frac{\pi}{4} + \sin \frac{2\pi}{3} - 4 \sin \frac{5\pi}{3} = -\frac{\sqrt{2}}{2} + \frac{\sqrt{3}}{2} - 4(-\frac{\sqrt{3}}{2}) = \frac{-\sqrt{2} + \sqrt{3} + 4\sqrt{3}}{2} = \frac{-\sqrt{2} + 5\sqrt{3}}{2}$

$f(x) = \begin{cases} x^2 + 5x & x \geq a \\ 2x + a + 2 & x \leq a \end{cases}$ $\begin{cases} x=a \\ f(a) \text{ ثابت } f(a) \end{cases} \Rightarrow \begin{cases} a^2 + 5a = 2a + a + 2 \Rightarrow a^2 + 4a - 2 = 0 \\ a^2 + 4a - 2 = 0 \end{cases}$ $\Delta = 16 + 8 = 24$ $\sqrt{\Delta} = 2\sqrt{6}$ $a = \frac{-4 \pm 2\sqrt{6}}{2} = -2 \pm \sqrt{6}$ $a = -2 + \sqrt{6}$ $f(1) = 1 + 5 = 6$ $1 + 2 + 2 = 5$ $f(1) = 5$

$f(n) = \begin{cases} 2n^2 - 6 & |n+1| \geq 2 \\ a + 2n & -3 \leq n \leq -1 \end{cases}$ $|n+1| \geq 2 \Rightarrow \begin{cases} n+1 \geq 2 \Rightarrow n \geq 1 \\ n+1 \leq -2 \Rightarrow n \leq -3 \end{cases}$ $f(n) = \begin{cases} 2n^2 - 6 & n \geq 1, n \leq -3 \\ a + 2n & -3 \leq n \leq -1 \end{cases}$ $n = -3 \Rightarrow 2(-3)^2 - 6 = 18 - 6 = 12$ $a + 2(-3) = a - 6$ $12 = a - 6 \Rightarrow a = 18$ $a + b = 18$

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

ب) $y = \frac{1}{2x^3 + 5x^2 + 2x + 4} \Rightarrow 2x^3 + 5x^2 + 2x + 4 \neq 0 \Rightarrow (x+2)(2x^2 + x + 2) \neq 0 \Rightarrow x \neq -2$ $D_f = \mathbb{R} - \{-2\}$

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

$I \cap II \Rightarrow D_f = [2, +\infty)$ جواب

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

$y = \sqrt{4x-a} + \sqrt{b-3x} \quad D_f = \{2\} \quad \frac{b}{a} = ? \Rightarrow \frac{4}{12} = \frac{1}{3}$ جواب

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

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

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

الف) $y = \sqrt{\frac{x^2-x-4}{x^2-13x^2+34}} \Rightarrow \frac{x^2-x-4}{x^2-13x^2+34} \geq 0 \Rightarrow \frac{(x+2)(x-3)}{(x-9)(x-4)} \geq 0$
 $x^2 = t \Rightarrow t^2 - 13t + 34$
 $x^2 = 9 \Rightarrow x = \pm 3$
 $D_f = (-\infty, -3) \cup (2, +\infty) - \{3\} \leq D_f = (-\infty, -3) \cup (2, 3) \cup (3, +\infty)$

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

الف) $y = \sqrt{\frac{x+1}{1-x-3}} + \sqrt{\frac{4-x}{x^2+2x+5}} \Rightarrow \frac{x+1}{1-x-3} \geq 0 \Rightarrow \frac{x+1}{-x-2} \geq 0$
 $\frac{4-x}{x^2+2x+5} \geq 0 \Rightarrow \frac{4-x}{(x+1)^2} \geq 0$
 $I \cap II \Rightarrow D_f = (-2, -1) \cup (3, 4]$

$$ب) y = \sqrt{[n]-4} + \sqrt{4-[n]} \quad \begin{cases} [n]-4 \geq 0 \leadsto [n] \geq 4 \leadsto \textcircled{I} [4, +\infty) \\ 4-[n] \geq 0 \leadsto [n] \leq 4 \leadsto \textcircled{II} (-\infty, 4] \end{cases}$$

$$\underline{I \cap II} \rightarrow D_f = \emptyset \quad \checkmark$$

$$الف (١٠-) \quad y = \sqrt{\frac{n+1}{|n-4|}} + \sqrt{\frac{4-n}{n^2+2n+2}} \quad \begin{cases} \frac{n+1}{|n-4|} \geq 0 \rightarrow n \geq -1, n \neq 4 \quad I \\ \frac{4-n}{n^2+2n+2} \geq 0 \rightarrow n \leq 4 \quad II \end{cases}$$

في فترة معرفيت مفرد! $\Delta < 0$ ، محاوره مثبت و بدون معرفيت

$$\underline{I \cap II} \rightarrow D_f = [-1, 4) \cup (4, 4] \subseteq [-1, 4] - \{4\}$$