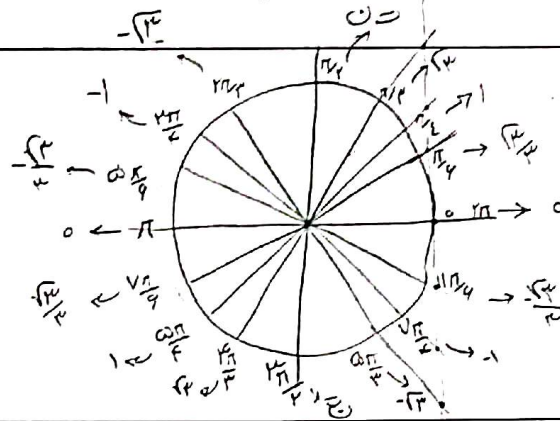




الف) $\sin \frac{\pi}{4} + \cos \pi + 2 \tan \frac{3\pi}{4} = \frac{1}{\sqrt{2}} - 1 + 2(-1) = -\frac{\sqrt{2}}{2} = -\frac{1}{\sqrt{2}}$

ب) $\frac{-\cos \frac{\pi}{4}}{\frac{1}{\sqrt{2}}} + \frac{\sin \frac{3\pi}{4}}{\frac{1}{\sqrt{2}}} - \frac{2 \sin \frac{5\pi}{6}}{-\frac{1}{2}(\frac{1}{\sqrt{2}})} = \frac{\sqrt{2}}{2} + \frac{\sqrt{2}}{2} + \frac{2\sqrt{2}}{1} = \frac{5\sqrt{2}}{2}$

ج) $\frac{\cot \frac{\pi}{4}}{-\frac{1}{\sqrt{2}}} + \frac{\cot \frac{\pi}{4}}{\frac{1}{\sqrt{2}}} - \frac{2 \cot \frac{\pi}{4}}{-2(-\frac{1}{\sqrt{2}})} = -\frac{\sqrt{2}}{2} + \frac{\sqrt{2}}{2} + \frac{2\sqrt{2}}{2} = \frac{4\sqrt{2}}{2}$

د) $\cos(\sin \pi) + \sin(\pi \cos \frac{\pi}{4}) = \cos 0 + \sin(\frac{\pi}{2}) = 2$

برای a هر ۲ رابطه ی x را داریم:

$$\begin{cases} x^2 + \varepsilon x & x=a \\ x^2 + a + x & \end{cases} \rightarrow \begin{cases} a^2 + \varepsilon a = a + a + x \\ a^2 + a - x = 0 \end{cases} \rightarrow \begin{cases} a + b + c = 0 \\ x = \frac{-b}{a} \end{cases} \xrightarrow{a > 0} \boxed{x=1}$$

$$\begin{cases} x^2 + \varepsilon x & x \geq 1 \\ x^2 + x & x \leq 1 \end{cases} \xrightarrow{x=1} \begin{cases} f(1) = (1)^2 + \varepsilon(1) = \omega \\ f(1) = 1(1) + 1 = \omega \end{cases}$$

برای $x = -1$ هر ۲ صدق می کند:

$$\begin{cases} x^2 - b & |x+1| \geq 2 \\ a + x & -3 \leq x \leq -1 \end{cases} \xrightarrow{x=-1} \begin{cases} 1 - b = a - \varepsilon \\ a + b = \varepsilon \end{cases}$$

برای $x \in \mathbb{R}$ هر ۲ صدق می کند:

$$y = \frac{1}{x^2 - \varepsilon x^2} \rightarrow x^2 - \varepsilon x^2 = 0 \quad \mathbb{R} - \{0, \varepsilon\}$$

$$x^2(x - \varepsilon) = 0 \rightarrow x \neq 0, x \neq \varepsilon$$

ب)
$$\frac{1}{x^2 + \varepsilon x^2 + x + \varepsilon} \xrightarrow{x \in \mathbb{R}} x^2 + \varepsilon x^2 + x + \varepsilon = 0$$

$$x^2(x^2 + \varepsilon) + x(x + \varepsilon) = 0 \rightarrow (x^2 + \varepsilon)(x + \varepsilon) = 0 \rightarrow \mathbb{R} - \{x^2 + \varepsilon, x + \varepsilon\}$$

$$\text{الف) } y = \sqrt{x^2-1} + \sqrt{x-2} \rightarrow \begin{matrix} x^2-1 \geq 0 \rightarrow x \geq 1 \\ x-2 \geq 0 \rightarrow x \geq 2 \end{matrix} \rightarrow \begin{matrix} x \geq 1 \\ x \leq -1 \\ x \geq 2 \\ x \leq -1 \end{matrix}$$

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$$\text{ب) } y = \frac{\sqrt{4-3x}}{\sqrt{9x-2}} \rightarrow \begin{matrix} 4-3x \geq 0 \rightarrow 4 \geq 3x \rightarrow 2 \geq x \\ 9x-2 \geq 0 \rightarrow 9x \geq 2 \rightarrow x \geq \frac{2}{9} \end{matrix} \rightarrow \begin{matrix} x \geq \frac{2}{9} \\ x \leq 2 \end{matrix} \rightarrow x \in (\frac{2}{9}, 2]$$

$$y = \sqrt{4x-a} + \sqrt{b-4x} \rightarrow \begin{matrix} 4x-a \geq 0 \rightarrow x \geq a/4 \\ b-4x \geq 0 \rightarrow x \leq b/4 \end{matrix}$$

$$\begin{matrix} a/4 \\ b/4 \end{matrix} \quad \begin{matrix} a/4 = b/4 = 2 \\ a=8, b=8 \end{matrix}$$

$$\frac{b}{a} = \frac{4}{4} = 1$$

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$$\text{الف) } y = \sqrt{\frac{x^2-x-4}{x^2-12x^2+4}} = \sqrt{\frac{(x-2)(x+2)}{(x^2-4)(x^2-4)}} \rightarrow \begin{matrix} (x-2)(x+2) \geq 0 \\ (x^2-4)(x^2-4) \geq 0 \end{matrix} \rightarrow \begin{matrix} x \in (-\infty, -2) \cup (2, +\infty) \\ x \in (-\infty, -2) \cup (2, +\infty) \end{matrix}$$

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$$\text{ب) } \sqrt{\frac{x^3-2x^2-5x+4}{x^4+2x^2-5x-4}} \rightarrow \begin{matrix} \frac{x^3-2x^2-5x+4}{x^4+2x^2-5x-4} \geq 0 \\ \frac{x^3-2x^2-5x+4}{x^4+2x^2-5x-4} \geq 0 \end{matrix} \rightarrow \begin{matrix} x \in (-\infty, -2) \cup (2, +\infty) \\ x \in (-\infty, -2) \cup (2, +\infty) \end{matrix}$$

$$\text{الف) } y = \sqrt{2[x]-2} \rightarrow 2[x]-2 \geq 0 \rightarrow 2[x] \geq 2 \rightarrow [x] \geq 1 \rightarrow x \geq 2$$

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$$\text{ب) } y = \sqrt{2[x]-5} \rightarrow 2[x]-5 \geq 0 \rightarrow 2[x] \geq 5 \rightarrow [x] \geq \frac{5}{2} \rightarrow x \geq 3$$

$$\text{الف) } y = \sqrt{\frac{x+1}{|x-3|}} + \sqrt{\frac{4-x}{x^2+2x+5}} \rightarrow \begin{matrix} \frac{x+1}{|x-3|} \geq 0 \rightarrow x \geq -1 \\ \frac{4-x}{x^2+2x+5} \geq 0 \rightarrow x \leq 4 \end{matrix} \rightarrow \begin{matrix} D = (-\infty, -1] \cup (5, +\infty) \\ D = (-2, 4] \end{matrix}$$

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$$\text{ب) } y = \sqrt{[x]-2} + \sqrt{2-[x]} \rightarrow \begin{matrix} [x]-2 \geq 0 \\ [x] \geq 2 \\ x \geq 2 \end{matrix} \quad \begin{matrix} 2-[x] \geq 0 \\ [x] \leq 2 \\ x < 3 \end{matrix} \rightarrow D = (-\infty, 2) \cup [2, +\infty)$$