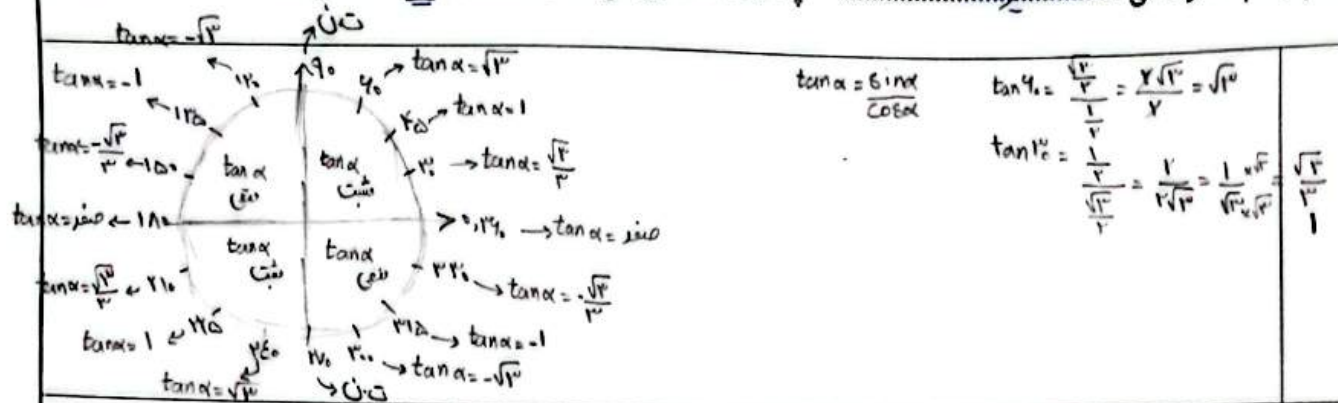




الف) $\sin \frac{\pi}{4} + \cos \pi + 2 \tan \frac{\pi}{4} = \frac{1}{\sqrt{2}} + (-1) + (2) = -\frac{1}{\sqrt{2}}$
 ب) $-\cos \frac{\pi}{4} + \sin \frac{\pi}{\sqrt{2}} - \sqrt{2} \sin \frac{\pi}{\sqrt{2}} = \frac{\sqrt{2}}{2} + \frac{\sqrt{2}}{2} - \sqrt{2} \left(\frac{\sqrt{2}}{2} \right) = +\frac{\sqrt{2}}{2}$
 ج) $\cot \frac{\pi}{\sqrt{2}} + \cot \frac{\pi}{\sqrt{2}} - 2 \tan \frac{\pi}{4} = -\frac{\sqrt{2}}{2} + \sqrt{2} \left(\frac{\sqrt{2}}{2} \right) - 2 \left(-\frac{\sqrt{2}}{2} \right) = \frac{\sqrt{2}}{2}$
 د) $\cos \left(\sin \frac{\pi}{4} \right) + \sin \left(\pi \cos \frac{\pi}{\sqrt{2}} \right) = 1 + 1 = 2$

$$f(x) = \begin{cases} x^2 + 2x & x \geq a \\ x^2 + a + 2 & x < a \end{cases} \quad \begin{aligned} a^2 + 2a &= 2a + a + 2 \\ a^2 + 2a - 2a - 2 &= 0 \\ a^2 + a - 2 &= 0 \\ (a+2)(a-1) &= 0 \end{aligned} \quad \begin{aligned} a &> 0 \\ a &= 1 \checkmark \\ a &= -2 \text{ غلط} \end{aligned}$$

 ب) $f(1) = 1^2 + 2 = 3$
 ج) $f(1) = 1^2 + a + 2 = 3$

$$f(x) = \begin{cases} x^2 - 6 & |x+1| \geq 2 \\ a + 2x & -2 < x+1 < -1 \end{cases} \rightarrow \begin{cases} x+1 \geq 2 \rightarrow x \geq 1 \\ x+1 < -1 \rightarrow x < -2 \end{cases}$$

$$\begin{aligned} x &= -2 \rightarrow x^2 - 6 = a + 2(-2) \\ 4 - 6 &= a - 4 \\ a &= 2 \end{aligned}$$

الف) $y = \frac{1}{x^2 - 2x}$ $\begin{aligned} x^2 - 2x &\neq 0 \\ x^2(x-2) &\neq 0 \\ x &\neq 0, 2 \end{aligned} \rightarrow \mathbb{R} - \{0, 2\}$

ب) $y = \frac{1}{x^2 + 2x^2 + 2x + 2}$ $\begin{aligned} x^2 + 2x^2 + 2x + 2 &\neq 0 \\ 3x^2 + 2x + 2 &\neq 0 \\ 3x^2 + 2x + 2 &= (x^2 + 1)(x + 2) \end{aligned} \rightarrow \begin{aligned} x^2 + 1 &\neq 0 \\ x + 2 &\neq 0 \end{aligned} \rightarrow \mathbb{R} - \{-2\}$

$$\text{ا) } y = \sqrt{x^2-1} + \sqrt{x-2} = \begin{matrix} x^2-1 \geq 0 \\ x^2 \geq 1 \\ x \geq 1 \text{ or } x \leq -1 \\ (-\infty, -1] \cup [1, +\infty) \end{matrix} \quad \begin{matrix} x-2 \geq 0 \\ x \geq 2 \\ [2, +\infty) \end{matrix} \quad \Rightarrow D_f = [2, +\infty)$$

$$\text{ب) } \frac{\sqrt{4-x}}{\sqrt{4x-1}} = \begin{matrix} 4-x \geq 0 \\ x \leq 4 \\ 4x-1 \geq 0 \\ x \geq \frac{1}{4} \end{matrix} \quad \Rightarrow \left(\frac{1}{4}, 4\right]$$

$$y = \sqrt{4x-a} + \sqrt{b-13x} \quad \frac{b}{a} = \frac{4}{13} = \frac{1}{13}$$

$$\begin{matrix} 4x-a \geq 0 \\ 13x \leq a \\ a \geq 13x \end{matrix} \quad \begin{matrix} b-13x \geq 0 \\ b \geq 13x \\ b \geq 4 \end{matrix}$$

$$\frac{a}{4} = 2 \rightarrow a = 8 \quad \frac{b}{13} = 2 \rightarrow b = 26$$

$$\text{ا) } \frac{x^2-x-4}{x^2-13x+14} \geq 0 \rightarrow \frac{(x-4)(x+1)}{(x-1)(x-14)} \geq 0$$

$$\begin{matrix} x^2-13x+14=0 \\ (x-1)(x-14)=0 \\ x=1, 14 \end{matrix} \quad \begin{matrix} x^2-13x+14=0 \\ (x-1)(x-14)=0 \\ x=1, 14 \end{matrix}$$

$$x^2-13x+14=0 \rightarrow x = \frac{13 \pm \sqrt{169-56}}{2} = \frac{13 \pm 11}{2} = 1, 14$$

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

$$\text{ب) } \frac{x^2-13x-5x+4}{x^2+13x-5x-4} = \frac{(x-1)(x-14)}{(x+1)(x-4)} \geq 0$$

$$\begin{matrix} (x-1)(x-14) \geq 0 \\ (x+1)(x-4) \geq 0 \end{matrix} \rightarrow \begin{matrix} x \leq -1 \text{ or } x \geq 14 \\ x \leq -4 \text{ or } x \geq 1 \end{matrix}$$

$$D_f = (-\infty, -4) \cup (-1, 1) \cup (14, +\infty)$$

$$\text{ا) } y = \sqrt{2[x]-4} \quad 2[x] \geq 4 \quad [x] \geq 2 \quad x \geq 2$$

$$D_f = [2, +\infty)$$

$$\text{ب) } y = \sqrt{2[x]-5} \quad 2[x]-5 \geq 0 \quad 2[x] \geq 5 \quad [x] \geq \frac{5}{2} = 2.5$$

$$D_f = [3, +\infty)$$

$$\text{ا) } y = \sqrt{\frac{x+1}{x-3}} + \sqrt{\frac{4-x}{x^2+13x+4}}$$

$$\begin{matrix} x+1 \geq 0 \\ x \geq -1 \end{matrix} \quad \begin{matrix} 4-x \geq 0 \\ x \leq 4 \end{matrix} \quad \Rightarrow D_f = [-1, 4]$$

$$D_f = [-1, 3) \cup (3, 4]$$

$$\text{ب) } y = \sqrt{[x]-4} + \sqrt{2-[x]} \quad [x] \geq 4, \quad 2 \geq [x]$$

$$[4, +\infty) \cap (-\infty, 2] = \emptyset$$

$$D_f = \emptyset$$