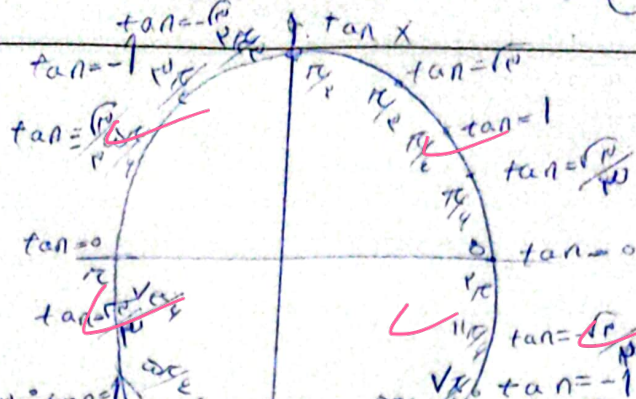




الف) $\sin \frac{\pi}{4} + \cos \frac{\pi}{4} + \tan \frac{\pi}{4} = \frac{\sqrt{2}}{2} + \frac{\sqrt{2}}{2} + 1 = \sqrt{2} + 1$
 $\rightarrow \frac{\sqrt{2}}{2} + (-1) + 1(-1) = -\sqrt{2}$
 ب) $-\cos \frac{5\pi}{4} + \sin \frac{3\pi}{4} = -\cos \frac{\pi}{4} + \sin \frac{\pi}{4} = -\frac{\sqrt{2}}{2} + \frac{\sqrt{2}}{2} = 0$
 $-\left(-\frac{\sqrt{2}}{2}\right) + \frac{\sqrt{2}}{2} - 1\left(-\frac{\sqrt{2}}{2}\right) = \frac{\sqrt{2}}{2} + \frac{\sqrt{2}}{2} + \frac{\sqrt{2}}{2} = \frac{3\sqrt{2}}{2}$
 ج) $\cos \left(\sin \frac{\pi}{4}\right) + \sin \left(\cos \frac{\pi}{4}\right) = \cos \frac{\sqrt{2}}{2} + \sin \frac{\sqrt{2}}{2}$
 $\cos 0 + \sin \frac{\pi}{4} \rightarrow 1 + \frac{\sqrt{2}}{2} = \frac{2 + \sqrt{2}}{2}$

$f(x) = \begin{cases} x^2 + \epsilon x & x \geq a \\ a + \epsilon x & x \leq a \end{cases}$ if $x = a \rightarrow a^2 + \epsilon a = a + \epsilon \rightarrow a^2 + a - \epsilon = 0$
 $(a + \epsilon)(a - 1)$
 $a \rightarrow -\epsilon x$
 $a \rightarrow 1$
 $\rightarrow f(1) = 1 + \epsilon$

$f(x) = \begin{cases} \epsilon x^2 - b & |x+1| \geq 1 \\ a + \epsilon x & -1 \leq x \leq 1 \end{cases}$ if $x = -1 \rightarrow 1 - b = a - \epsilon$
 $\rightarrow a + b = \epsilon$

الف) $y = \frac{1}{x^2 - \epsilon x} = \frac{1}{x^2(x - \epsilon)}$
 $Df = \mathbb{R} - \{0, \epsilon\}$
 ب) $y = \frac{1}{x^2 + \epsilon x^2 + \epsilon x + \epsilon} = \frac{1}{x^2(1 + \epsilon) + \epsilon(x + 1)}$
 $\Rightarrow \frac{1}{x^2(1 + \epsilon) + \epsilon(x + 1)} \Rightarrow \frac{1}{x^2(1 + \epsilon) + \epsilon(x + 1)}$
 $Df = \mathbb{R} - \{-1\}$

الف) $y = \sqrt{x^2 - 1} + \sqrt{x - 2}$
 $x^2 - 1 \geq 0$ $x - 2 \geq 0$
 $\rightarrow (x+1)(x-1) \geq 0$ $x \geq 2$

ب) $y = \frac{\sqrt{4-x^2}}{\sqrt{x^2-4}}$
 $4-x^2 \geq 0$ $x^2-4 > 0$
 $2 > x \leftarrow \rightarrow x < -2$

Sign charts:
 For (a): $\frac{-1}{+} \quad \frac{1}{-} \quad \frac{2}{+}$
 For (b): $\frac{2}{+} \quad \frac{-2}{-}$

$D_f = [2, +\infty)$

$y = \sqrt{4x-a} + \sqrt{b-4x}$
 $D_f = 2 \rightarrow$ $y=0 \rightarrow \sqrt{4x-a} = 0$ $\sqrt{b-4x} = 0$
 $4x-a=0$ $b-4x=0$
 $a=8$ $b=8$

$\frac{b}{a} = \frac{8}{8} = 1$

الف) $y = \sqrt{x^2 - 4}$
 $x^2 - 4 \geq 0$
 $x \geq 2$ $x \leq -2$

ب) $y = \sqrt{x^2 - 4}$
 $x^2 - 4 \geq 0$
 $x \geq 2$ $x \leq -2$

$D_f = [2, +\infty)$

$y = \sqrt{\frac{x^2 - x - 6}{x^2 - 10x + 24}}$ $= \sqrt{\frac{(x-3)(x+2)}{(x-2)(x-8)}}$

Sign chart for (a): $\frac{-\infty}{+} \quad \frac{-2}{-} \quad \frac{3}{+} \quad \frac{8}{-} \quad \frac{+\infty}{+}$

Sign chart for (b): $\frac{-\infty}{+} \quad \frac{-2}{-} \quad \frac{-1}{+} \quad \frac{1}{-} \quad \frac{2}{+} \quad \frac{+\infty}{-}$

$D_f = (-\infty, -2) \cup (2, 3) \cup (8, +\infty)$

الف) $y = \sqrt{\frac{x+1}{x^2-4}} + \sqrt{\frac{4-x}{x^2+4x+4}}$

Sign chart for (a): $\frac{-1}{-} \quad \frac{0}{0} \quad \frac{4}{+}$

Sign chart for (b): $\frac{4}{+} \quad \frac{0}{0} \quad \frac{-4}{-}$

$D_f = [-1, 4] \cup [4, +\infty)$