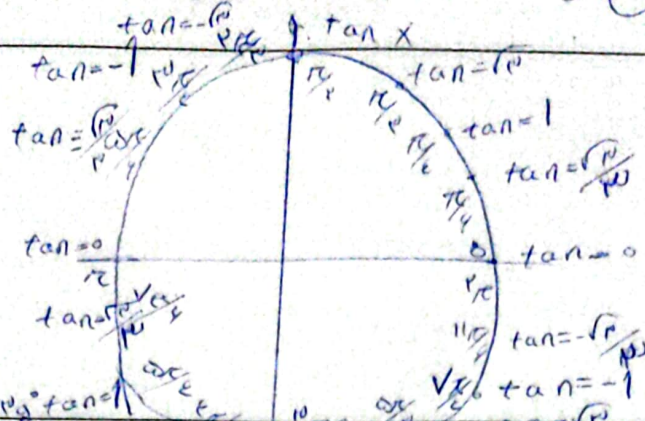




الف) $\sin \frac{\pi}{4} + \cos \pi + \sqrt{2} \tan \frac{\pi}{4}$
 $\rightarrow \frac{1}{\sqrt{2}} + (-1) + \sqrt{2}(-1) = -\sqrt{2}$

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

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

د) $\cos(\sin \pi) + \sin(\pi \cos \frac{\pi}{4})$
 $\cos 0 + \sin \frac{\pi}{2} \rightarrow 1 + \frac{1}{\sqrt{2}} = \frac{\sqrt{2} + 1}{\sqrt{2}}$

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

$\rightarrow f(1) = 1 + \epsilon$

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

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

ب) $y = \frac{1}{x^2} = \frac{1}{x^2(x+\epsilon)}$
 $\frac{1}{x^2} + \frac{\epsilon}{x^3} + \frac{\epsilon}{x^2} + \epsilon$
 $\frac{1}{x^2} + \frac{\epsilon}{x^3} + \frac{\epsilon}{x^2} + \epsilon \Rightarrow \frac{1}{x^2} + \frac{\epsilon}{x^3} + \frac{\epsilon}{x^2} + \epsilon$
 $Df = \mathbb{R} - \{-1\}$

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

Sign chart for $(x+1)(x-1) \geq 0$:
 $\begin{array}{c|ccc} & -1 & & 1 \\ \hline & + & - & + \end{array}$

$D_f = [1, +\infty)$

ب) $y = \frac{\sqrt{4-x^2}}{\sqrt{4x-2}}$
 $4-x^2 \geq 0$ $4x-2 > 0$
 $2 > x \leftarrow \cap \rightarrow x > \frac{1}{2}$
 $D_f = (\frac{1}{2}, 2]$

$y = \sqrt{4x-a} + \sqrt{b-4x}$
 $D_f = 2 \rightarrow$ $\text{في } y=0 \rightarrow \sqrt{4x-a} = 0, \sqrt{b-4x} = 0$ ($b/a = \frac{4}{12} = \frac{1}{3}$)
 $4x-a=0 \rightarrow x = \frac{a}{4}$
 $b-4x=0 \rightarrow x = \frac{b}{4}$
 $\frac{a}{4} = \frac{b}{4} \rightarrow a=b$
 $a=12 \rightarrow b=4$

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

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

ب) $y = \sqrt{x^2 - 4}$
 $x^2 - 4 \geq 0$
 $x^2 \geq 4$
 $|x| \geq 2$
 $x \geq 2$ or $x \leq -2$
 $D_f = (-\infty, -2] \cup [2, +\infty)$

$y = \sqrt{\frac{x^2 - x - 6}{x^2 - 10x + 24}} = \sqrt{\frac{(x-3)(x+2)}{(x-2)(x-4)}}$

Sign chart for $\frac{(x-3)(x+2)}{(x-2)(x-4)}$:
 $\begin{array}{c|ccccccc} & -\infty & & -2 & & -3 & & 2 & & 4 & & +\infty \\ \hline & + & - & + & - & + & - & + & - & + & - \end{array}$

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

ب) $y = \sqrt{\frac{x^2 - 10x + 24}{x^2 - 10x + 24}}$
 $\frac{x^2 - 10x + 24}{x^2 - 10x + 24} \geq 0$
 $\frac{(x-2)(x-4)}{(x-2)(x-4)} \geq 0$
 $(x-2)(x-4) \geq 0$
 $x \geq 4$ or $x \leq 2$
 $D_f = (-\infty, 2] \cup [4, +\infty)$

الف) $y = \sqrt{\frac{x+1}{x^2-1}} + \sqrt{\frac{4-x}{x^2+4x+4}}$
 $\frac{x+1}{x^2-1} \geq 0$ $\frac{4-x}{x^2+4x+4} \geq 0$
 $\frac{x+1}{(x-1)(x+1)} \geq 0$ $\frac{4-x}{(x+2)^2} \geq 0$
 $\frac{1}{x-1} \geq 0$ $4-x \geq 0$
 $x > 1$ $x \leq 4$
 $\cap \rightarrow D_f = (1, 4]$

ب) $y = \sqrt{\frac{x+1}{x^2-1}} + \sqrt{\frac{4-x}{x^2+4x+4}}$
 $\frac{x+1}{x^2-1} \geq 0$ $\frac{4-x}{x^2+4x+4} \geq 0$
 $x > 1$ $x \leq 4$
 $\cap \rightarrow D_f = (1, 4]$