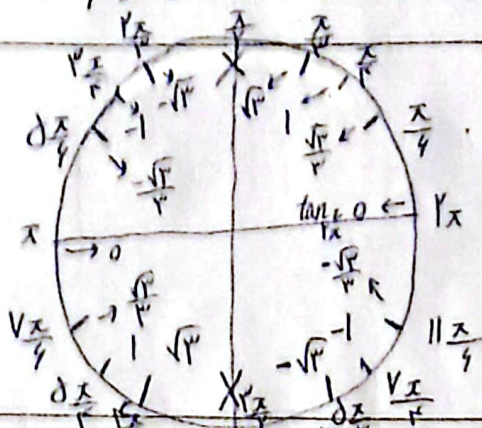




tan, 3/4, 2/4, 1/4, 0, -1/4, -2/4, -3/4

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

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

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

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

$f(x) = \begin{cases} x^2 + 2x & x \geq a \\ 2x + a + 2 & x < a \end{cases} \quad a > 0 \quad f(1) = ?$

$x = a \Rightarrow a^2 + 2a = 2a + a + 2 \Rightarrow a^2 + a - 2 = 0 \Rightarrow a = 1 \text{ or } a = -2$
 $a > 0 \Rightarrow a = 1$
 $f(x) = \begin{cases} x^2 + 2x & x \geq 1 \\ 2x + 3 & x < 1 \end{cases}$
 $f(1) = 1^2 + 2 = 3$

$f(x) = \begin{cases} 2x^2 - b & |x+1| \geq 2 \\ a + 2x & -3 \leq x \leq -1 \end{cases} \rightarrow \begin{cases} x+1 \geq 2 & x+1 \leq -2 \\ x \geq 1 & x \leq -3 \end{cases}$

$x = -3 \Rightarrow 2(-3)^2 - b = a + 2(-3) \Rightarrow 18 - b = a - 6 \Rightarrow a + b = 24$

الف) $y = \frac{1}{x^3 - 2x^2}$

$x^3 - 2x^2 \neq 0 \Rightarrow x^2(x-2) \neq 0 \Rightarrow x \neq 2 \Rightarrow D_f = \mathbb{R} - \{0, 2\}$

ب) $y = \frac{1}{2x^3 + 2x^2 + x + 2}$

$2x^3 + 2x^2 + x + 2 \neq 0 \Rightarrow x^3 + x + 2x^2 + 2 \neq 0 \Rightarrow x(x^2 + 1) + 2(x^2 + 1) \neq 0 \Rightarrow (x^2 + 1)(x + 2) \neq 0 \Rightarrow x \neq -2$

$D_f = \mathbb{R} - \{-2\}$

$$\text{الف) } \sqrt{x^2-1} + \sqrt{x-2} \Rightarrow \begin{cases} x^2-1 \geq 0 \\ x-2 \geq 0 \end{cases} \Rightarrow \begin{cases} x \geq 1 \\ x \geq 2 \end{cases} \Rightarrow \boxed{D_f = [2, \infty)}$$

$$\text{ب) } \frac{\sqrt{4-3x}}{\sqrt{4x-3}} \Rightarrow \begin{cases} 4-3x \geq 0 \\ 4x-3 \geq 0 \end{cases} \Rightarrow \begin{cases} x \leq \frac{4}{3} \\ x \geq \frac{3}{4} \end{cases} \Rightarrow \boxed{D_f = (\frac{3}{4}, \frac{4}{3}]}$$

$$y = \sqrt{4x-a} + \sqrt{b-3x} \quad D_f = \{x\} \quad \frac{b}{a} = ?$$

$$\begin{cases} 4x-a \geq 0 \\ 4x \geq a \end{cases} \Rightarrow x \geq \frac{a}{4} \quad \begin{cases} b-3x \geq 0 \\ 3x \leq b \end{cases} \Rightarrow x \leq \frac{b}{3} \Rightarrow D_f = [\frac{a}{4}, \frac{b}{3}] = \{x\}$$

$$\frac{a}{4} = \frac{b}{3} = x \Rightarrow \begin{cases} a = 4x \\ b = 4x \end{cases}$$

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

$$\text{الف) } y = \sqrt{\frac{x^2-x-4}{x^2-13x^2+34}} \Rightarrow \frac{x^2-x-4}{x^2-13x^2+34} \geq 0 \Rightarrow \frac{(x-3)(x+2)}{(x-3)(x+3)(x-2)(x+2)} \geq 0$$

$$\frac{(x-3)(x+2)}{(x-3)(x+3)(x-2)(x+2)} \geq 0 \Rightarrow \frac{(x-3)(x+2)}{(x-3)(x+3)(x-2)(x+2)} \geq 0$$

$$\boxed{D_f = (-\infty, -3) \cup (2, 3) \cup (3, \infty)}$$

$$\text{ب) } y = \sqrt{\frac{x^2-2x^2-8x+4}{x^2+x^2-8x-4}} \Rightarrow \frac{x^2-2x^2-8x+4}{x^2+x^2-8x-4} \geq 0 \Rightarrow \frac{(x-3)(x+2)(x-1)}{(x+3)(x-2)(x+1)} \geq 0$$

$$\boxed{D_f = (-\infty, -3) \cup [-2, -1) \cup [1, 2) \cup [3, \infty)}$$

$$\text{الف) } y = \sqrt{2[x]-3} \Rightarrow 2[x]-3 \geq 0 \Rightarrow [x] \geq \frac{3}{2} \Rightarrow \boxed{D_f = [2, \infty)}$$

$$\text{ب) } y = \sqrt{2[x]-8} \Rightarrow 2[x]-8 \geq 0 \Rightarrow [x] \geq \frac{8}{2} \Rightarrow \boxed{D_f = [4, \infty)}$$

$$\text{الف) } \sqrt{\frac{x+1}{|x-3|}} + \sqrt{\frac{4-x}{x^2+x+3}} \Rightarrow \begin{cases} \frac{x+1}{|x-3|} \geq 0 \\ \frac{4-x}{x^2+x+3} \geq 0 \end{cases} \Rightarrow \begin{cases} x+1 \geq 0 \\ x \neq 3 \end{cases} \Rightarrow \boxed{D_f = [-1, 3) \cup (3, 4]}$$

$$\text{ب) } y = \sqrt{[x]-3} + \sqrt{4-[x]} \Rightarrow \begin{cases} [x]-3 \geq 0 \\ 4-[x] \geq 0 \end{cases} \Rightarrow \begin{cases} [x] \geq 3 \\ [x] \leq 4 \end{cases} \Rightarrow \boxed{D_f = \emptyset}$$