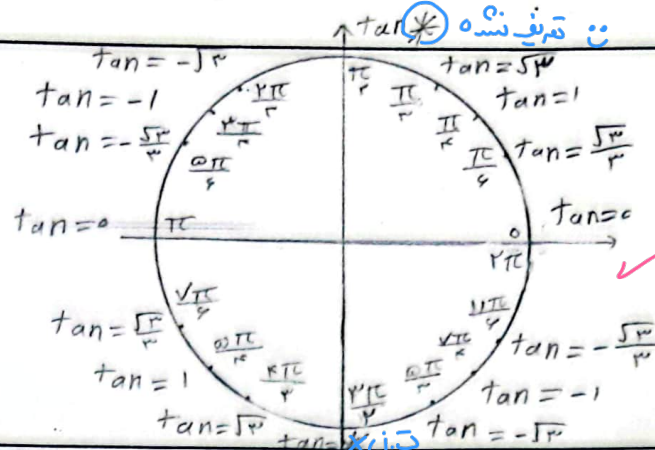




الف) $\sin \frac{\pi}{2} + \cos \pi + 2 \tan \frac{3\pi}{4}$

$\rightarrow \sin \frac{\pi}{2} + \cos \pi + 2 \tan 135^\circ$

$\rightarrow \frac{1}{1} + (-1) + 2(-1) = -2$

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

$-\cos 90^\circ + \sin 135^\circ - 3 \sin 60^\circ$

$\rightarrow -(-\frac{\sqrt{3}}{2}) + \frac{\sqrt{2}}{2} - 3(\frac{\sqrt{3}}{2}) = \frac{\sqrt{2}-\sqrt{3}}{2}$

ج) $\cot \frac{\pi}{3} + 3 \cot \frac{\pi}{4} - 2 \tan \frac{\pi}{4}$

$\rightarrow \cot 60^\circ + 3 \cot 45^\circ - 2 \tan 45^\circ$

$\rightarrow -\frac{\sqrt{3}}{3} + 3 \frac{\sqrt{3}}{3} - 2(1) = \frac{2\sqrt{3}}{3} - 2$

د) $\cos(\sin \pi) + \sin(\pi \cos \frac{\pi}{3})$

$\rightarrow \cos 0 + \sin \frac{\pi}{2} \rightarrow 1 + \sin 90^\circ = 2$

$f(x) = \begin{cases} x^2 + 5x & x \geq a \\ 2x + a + 2 & x \leq a \end{cases}$

$a > 0$

$f(1) = ?$

If $x = a \Rightarrow a^2 + 5a = 2a + 2 \rightarrow a^2 + 3a - 2 = 0 \Rightarrow (a+2)(a-1)$

$a = -2$ or $a = 1$

$f(1) = 1 + 5 = 6$

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

$a + b$

If $x = -3 \Rightarrow 18 - b = a - 6$

$\Rightarrow a + b = 18 + 6 = 24$

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

$D_f = \mathbb{R} - \{0, 4\}$

$x^2 \neq 0 \Rightarrow x \neq 0$

$x-4 \neq 0 \Rightarrow x \neq 4$

ب) $y = \frac{1}{2x^2 + 5x^2 + 2x + 4} = \frac{1}{(2x+1)(2x+4)}$

$2x^2 + 5x^2 + 2x + 4$

$\rightarrow 2x(2x+1) + 4(2x+1)$

$\rightarrow (2x+1)(2x+4)$

$2x+1 \neq 0$

$2x+4 \neq 0$

$x \neq -2$

$D_f = \mathbb{R} - \{-\frac{1}{2}, -2\}$

$$a) y = \sqrt{x-1} + \sqrt{x-2}$$

$$x-1 \geq 0 \quad x-2 \geq 0$$

$$\Rightarrow (x+1)(x-1) \geq 0 \quad x \geq 2$$

$$\begin{array}{c} -1 \quad 1 \\ + \quad - \quad + \end{array}$$

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

$$b) y = \frac{\sqrt{4-3x}}{\sqrt{4x-3}}$$

$$4-3x \geq 0 \quad 4x-3 \geq 0$$

$$4 \geq 3x \quad 4x \geq 3$$

$$x \leq \frac{4}{3} \quad x \geq \frac{3}{4}$$

$$D_f = \left[\frac{3}{4}, \frac{4}{3}\right]$$

$$y = \sqrt{4x-a} + \sqrt{b-3x}$$

$$D_f = \mathbb{R} \rightarrow \begin{cases} 4x-a \geq 0 \\ b-3x \geq 0 \end{cases}$$

$$\downarrow$$

$$12-a \geq 0 \quad b-9 \geq 0$$

$$\Rightarrow a \leq 12 \quad b \geq 9$$

$$\frac{b}{a} = \frac{9}{12} = \frac{3}{4}$$

$$a) y = \sqrt{\frac{x^2-x-6}{x^2-13x+42}} = \sqrt{\frac{(x-3)(x+2)}{(x-3)(x+7)(x-2)(x+6)}}$$

$$\begin{array}{c} -3 \quad -2 \quad 2 \quad 6 \\ + \quad - \quad - \quad + \end{array}$$

$$D_f = (-\infty, -3) \cup (-2, 2) \cup (6, +\infty) - \{3\}$$

$$b) y = \sqrt{\frac{x^3-2x^2-0x+6}{x^3+13x^2+0x-6}} = \sqrt{\frac{(x-1)(x-2)(x+3)}{(x+1)(x+3)(x-2)}}$$

$$\begin{array}{c} -3 \quad -2 \quad -1 \quad 1 \quad 2 \quad 3 \\ + \quad - \quad - \quad + \quad - \quad + \end{array}$$

$$D_f = (-\infty, -3) \cup (-2, -1) \cup (1, 2) \cup (3, +\infty)$$

$$a) y = \sqrt{2[x]-5}$$

$$2[x]-5 \geq 0$$

$$2[x] \geq 5$$

$$[x] \geq \frac{5}{2}$$

$$x \geq \frac{5}{2}$$

$$D_f = \left[\frac{5}{2}, +\infty\right)$$

$$b) y = \sqrt{2[x]-0}$$

$$2[x]-0 \geq 0$$

$$2[x] \geq 0$$

$$[x] \geq 0$$

$$x \geq 0$$

$$D_f = [0, +\infty)$$

$$a) y = \sqrt{\frac{x+1}{x-3}} + \sqrt{\frac{4-x}{x^2+2x+5}}$$

$$\begin{array}{c} -1 \quad 3 \\ - \quad + \end{array}$$

$$\begin{array}{c} 4 \\ + \end{array}$$

$$D_f = [-1, 4] - \{3\}$$

$$b) y = \sqrt{[x]-5} + \sqrt{2-[x]}$$

$$[x] \geq 5$$

$$x \geq 5$$

$$2 \geq [x]$$

$$2 \geq x$$

$$D_f = \emptyset$$