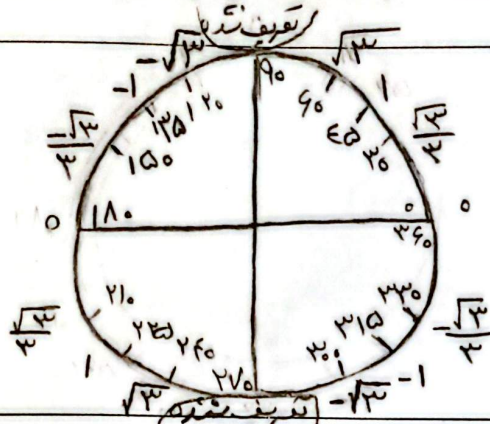




۱) $\sin \frac{\pi}{6} + \cos \pi + 2 \tan \frac{3\pi}{4} = \frac{1}{2} + (-1) + 2(-1) = \frac{1}{2} - 3 = -\frac{5}{2}$

۲) $-\cos \frac{5\pi}{6} + \sin \frac{2\pi}{3} - 3 \sin \frac{4\pi}{3} = -(-\frac{\sqrt{3}}{2}) + \frac{\sqrt{3}}{2} - 3(-\frac{\sqrt{3}}{2}) = \frac{5\sqrt{3}}{2}$

۳) $\cot \frac{2\pi}{3} + 2 \cot \frac{\pi}{3} - 2 \tan \frac{5\pi}{6} = -\frac{1}{\sqrt{3}} + \frac{2\sqrt{3}}{1} + \frac{2\sqrt{3}}{1} = \frac{5\sqrt{3}}{1}$

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

$f(x) = \begin{cases} x^2 + 4x & x \geq a \\ 2x + a + 2 & x \leq a \end{cases}$ $x=a \rightarrow y=a^2+4a$ $x=a \rightarrow y=2a+a+2$ $a^2+4a=2a+a+2$ $a^2+3a-2=0$ $(a+4)(a-1)=0$ $a=-4$ $a=1$

$f(x) = \begin{cases} x^2 + 4x & x \geq 1 \\ 2x + 3 & x \leq 1 \end{cases}$ $x=1 \rightarrow (1)^2 + 4(1) = 5$

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

$f(x) = \begin{cases} x^2 - b & 1 \leq x \leq -3 \\ a+2x & -2 \leq x \leq -1 \end{cases}$ $x=-3 \rightarrow y=11-b$ $x=-3 \rightarrow y=a-4$ $a-4=11-b$ $a+b=15$

۱) $\frac{1}{x^3 - 4x^2} \rightarrow \frac{1}{x^2(x-4)}$ $x^2 \neq 0$ $x-4 \neq 0$ $x \neq 0$ $x \neq 4$ $R = \{0, 4\}$

۲) $\frac{1}{x^3 + 4x^2 + 2x + 4} \rightarrow \frac{1}{(x^2 + 4x)(x+2)} = \frac{1}{x(x+2)(x+2)} = \frac{1}{x(x+2)^2}$ $x^2 + 1 \neq 0$ $x^2 \neq -1$ $x+2 \neq 0$ $x \neq -2$ $R = \{-2\}$

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

$(-\infty, -1] \cup [1, +\infty) \cap [2, +\infty) \rightarrow [2, +\infty)$

ب) $y = \frac{\sqrt{4-3x}}{\sqrt{4x-3}}$ $4-3x \geq 0 \quad 3x \leq 4 \quad x \leq \frac{4}{3}$ $4x-3 \geq 0 \quad 4x \geq 3 \quad x \geq \frac{3}{4}$

$(-\infty, \frac{4}{3}] \cap (\frac{3}{4}, +\infty) \rightarrow (\frac{3}{4}, \frac{4}{3}]$

$y = \sqrt{4x-a} + \sqrt{b-3x}$ $4x-a \geq 0 \quad 4x \geq a \quad x \geq \frac{a}{4}$ $b-3x \geq 0 \quad 3x \leq b \quad x \leq \frac{b}{3}$

$(-\infty, \frac{b}{3}] \cap [\frac{a}{4}, +\infty) \rightarrow \frac{b}{3} = \frac{a}{4} = 2$

$a = 8 \quad b = 6$ $\frac{b}{a} = \frac{6}{8} = \frac{3}{4}$

الف) $y = \sqrt{\frac{x^2 - x - 6}{x^2 - 13x + 42}}$ $\frac{x^2 - x - 6}{x^2 - 13x + 42} \geq 0$ $(x-3)(x+2) \geq 0$ $(x^2 - 4)(x^2 - 9) \geq 0$ $(x-2)(x+2)(x-3)(x+3) \geq 0$

$(-\infty, -3) \cup (-2, 2) \cup (3, +\infty)$

ب) $y = \sqrt{\frac{x^3 - 2x^2 - 5x + 6}{x^3 + 2x^2 - 5x - 6}}$ $\frac{x^3 - 2x^2 - 5x + 6}{x^3 + 2x^2 - 5x - 6} \geq 0$ $(x-3)(x+2)(x-1) \geq 0$ $(x+3)(x-2)(x+1) \geq 0$

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

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

$[2.5, +\infty)$

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

$[2.5, +\infty)$

الف) $y = \sqrt{\frac{x+1}{|x-3|}} + \sqrt{\frac{4-x}{x^2+2x+5}}$ $\frac{x+1}{|x-3|} \geq 0$ $\frac{4-x}{x^2+2x+5} \geq 0$ $(-\infty, 4] \cap [-1, 3) \cup (3, +\infty) \rightarrow [-1, 3) - \{3\}$

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

$(2.5, +\infty) \cap (-\infty, 2) = \emptyset$