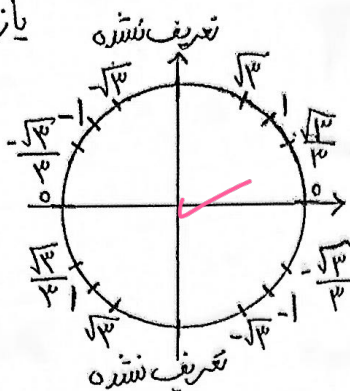




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الف) $\sin \frac{\pi}{6} + \cos \pi + 2 \tan \frac{3\pi}{4} = \frac{1}{2} + (-1) + 2(-1) = \frac{1-2-2}{2} = \frac{-3}{2}$

ب) $-\cos \frac{5\pi}{6} + \sin \frac{7\pi}{6} + 3 \sin \frac{\pi}{3} = -(-\frac{\sqrt{3}}{2}) + (-\frac{1}{2}) + 3(\frac{\sqrt{3}}{2}) = \frac{\sqrt{3}-1+3\sqrt{3}}{2} = \frac{4\sqrt{3}-1}{2}$

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

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

$f(x) = \begin{cases} x^2 + 2x & x \geq a \\ 2x + a + 2 & x < a \end{cases} \xrightarrow{x=a} a^2 + 2a = 2a + a + 2 \Rightarrow a^2 + a - 2 = 0 \Rightarrow a = 1 \vee a = -2$

چون گفته که $f(1) = (1)^2 + 2(1) = 3$

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

① $x+1 \geq 2 \Rightarrow x \geq 1$
 ② $x+1 \leq -2 \Rightarrow x \leq -3$

چون $x = -3$ در دامنه $-3 \leq x < -1$ قرار دارد، پس $2(-3)^2 - b = a + 2(-3) \Rightarrow a + b = 24$

الف) $y = \frac{1}{x^3 - 4x^2} = \frac{1}{x^2(x-4)}$

دومین روش: $\frac{1}{x^2(x-4)} = \frac{A}{x} + \frac{B}{x^2} + \frac{C}{x-4}$

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

چون $2x^3 + 5x^2 + 2x + 4 \neq 0$ برای هیچ x حقیقی، پس $D_f = \mathbb{R} - \{0, 4\}$

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

① $x^2 - 1 \geq 0 \Rightarrow x \leq -1$ یا $x \geq 1$
 ② $x - 2 \geq 0 \Rightarrow x \geq 2$

پس $D_f = [2, +\infty)$

ب) $y = \frac{\sqrt{2x-3}}{\sqrt{6x-3}}$

① $2x-3 \geq 0 \Rightarrow x \geq \frac{3}{2}$
 ② $6x-3 > 0 \Rightarrow x > \frac{1}{2}$

پس $D_f = [\frac{3}{2}, +\infty)$

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

① $x-a \geq 0 \Rightarrow x \geq \frac{a}{6}$
 ② $b-3x \geq 0 \Rightarrow x \leq \frac{b}{3}$

چون دامنه نقطه یک عضو دارد، پس $\frac{a}{6} = \frac{b}{3} \Rightarrow \frac{b}{a} = \frac{2}{1} = \frac{1}{2}$

الف) $y = \sqrt{\frac{x^2 - x - 2}{x^4 - 13x^2 + 36}}$

$\Rightarrow \frac{(x-2)(x+2)}{(x-2)(x+2)(x-3)(x+4)} \geq 0 \Rightarrow \frac{1}{(x-3)(x+4)} \geq 0$

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

ب) $y = \sqrt{\frac{x^2 - 2x^2 - 2x + 6}{x^3 + 2x^2 - 2x - 6}}$

① $x^2 - 2x^2 - 2x + 6 \geq 0 \Rightarrow -x^2 - 2x + 6 \geq 0 \Rightarrow x^2 + 2x - 6 \leq 0$

② $x^3 + 2x^2 - 2x - 6 > 0$

پس $D_f = (-\infty, -3) \cup [-1, 1] \cup (3, +\infty)$

الف) $y = \sqrt{2[x] - 4} \Rightarrow 2[x] - 4 \geq 0 \Rightarrow [x] \geq 2 \Rightarrow D_f = [2, +\infty)$

ب) $y = \sqrt{2[x] - 5} \Rightarrow 2[x] - 5 \geq 0 \Rightarrow [x] \geq \frac{5}{2} \Rightarrow D_f = [3, +\infty)$

الف) $y = \sqrt{\frac{-1}{x+1}} + \sqrt{\frac{4-x}{x^2+2x+4}} \Rightarrow \left\{ \begin{array}{l} ① \frac{x+1}{|x-3|} \geq 0 \Rightarrow \frac{-1}{x+1} \geq 0 \Rightarrow [-1, +\infty) - \{3\} \\ ② \frac{4-x}{x^2+2x+4} \geq 0 \Rightarrow \frac{4}{x+1} \geq 0 \Rightarrow x < 4 \end{array} \right\} \Rightarrow D_f = [-1, 4] - \{3\}$

$\Delta = 4 - 16 = -12 < 0 \Rightarrow$ ریشه در اعداد حقیقی ندارد و همواره +

ب) $y = \sqrt{[x] - 4} + \sqrt{2 - [x]} \Rightarrow \left\{ \begin{array}{l} ① [x] - 4 \geq 0 \Rightarrow [x] \geq 4 \Rightarrow x \geq 4 \\ ② 2 - [x] \geq 0 \Rightarrow [x] \leq 2 \Rightarrow x < 3 \end{array} \right\} \Rightarrow D_f = \emptyset$

چون اشتراکی ندارند