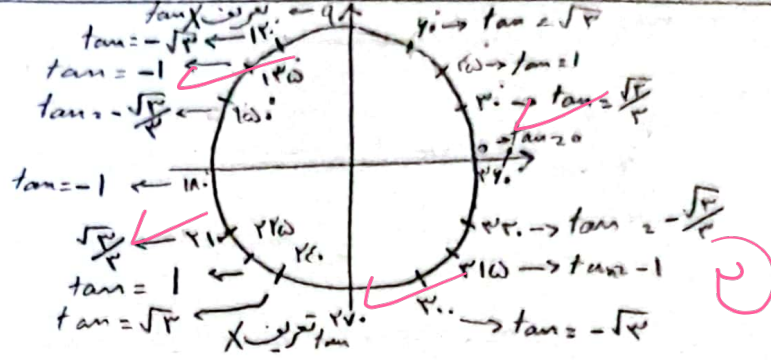


۲۰. آزمون عالی نوشتی!



الف) $\sin \frac{\pi}{4} + \cos \pi + 2 \tan \frac{3\pi}{4} \rightarrow \sin 45^\circ + \cos 180^\circ + 2(\tan 135^\circ) = \frac{1}{\sqrt{2}} + (-1) + 2(-1) = -\frac{1}{\sqrt{2}}$

ب) $-\cos \frac{\pi}{4} + \sin \frac{2\pi}{3} - 2 \sin \frac{\pi}{3} \rightarrow -\cos 45^\circ + \sin 120^\circ - 2(\sin 60^\circ) = -\frac{\sqrt{2}}{2} + \frac{\sqrt{3}}{2} - 2(\frac{\sqrt{3}}{2}) = \frac{\sqrt{2}}{2} - \sqrt{3}$

ج) $\cot \frac{\pi}{3} + 2(\cot \frac{\pi}{3} - 2 \tan \frac{\pi}{4}) \rightarrow \cot 60^\circ + 2(\cot 60^\circ - 2 \tan 45^\circ) = \frac{1}{\sqrt{3}} + 2(\frac{1}{\sqrt{3}} - 2) = \frac{4}{\sqrt{3}} - 4$

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

بازی $n \geq a \rightarrow a^2 + a = 2a + a + 2 \rightarrow a^2 + a - 2 = 0 \rightarrow a = -2 \text{ یا } a = 1$

$f(n) = \begin{cases} n^2 + 2n & n \geq 1 \\ 2n + 2 & n \leq 1 \end{cases}$

$f(1) \rightarrow 2 \times 1 + 2 = 4$

$\begin{cases} 2n^2 - b & |n+1| \geq 2 \rightarrow \begin{matrix} n+1 \geq 2 \rightarrow n \geq 1 \\ n+1 \leq -2 \rightarrow n \leq -3 \end{matrix} \\ a + 2n & -2 \leq n \leq -1 \end{cases}$

بازی $n = -2 \rightarrow 18 - b = a - 2 \rightarrow a + b = 20$

الف) $y = \frac{1}{n^2 - 4n^2} \rightarrow \frac{1}{n^2(n-4)} \rightarrow D_f = \mathbb{R} - \{0, 4\}$

ب) $y = \frac{1}{2n^2 + 4n^2 + 2n + 4} \rightarrow \frac{1}{2n(n+1) + 2(n+1)} \rightarrow \frac{1}{(n+1)(2n+2)} \rightarrow D_f = \mathbb{R} - \{-1, -2\}$

هر دو در $x = 0$ و $x = -1$ و $x = -2$ مخرج صفر می‌شود.

الف) $y = \sqrt{x^2-1} + \sqrt{x-2} \geq 0 \rightarrow x-2 \geq 0 \rightarrow x \geq 2$
 $x^2-1 \geq 0 \rightarrow x \geq 1$ $\left\{ \begin{array}{l} x \geq 2 \\ x \geq 1 \end{array} \right\} \rightarrow x \geq 2$

ب) $y = \frac{\sqrt{4-3x}}{\sqrt{4x-3}} \geq 0 \rightarrow 4-3x \geq 0 \rightarrow 3x \leq 4 \rightarrow x \leq \frac{4}{3}$
 $4x-3 \geq 0 \rightarrow 4x \geq 3 \rightarrow x \geq \frac{3}{4}$
 $\left\{ \begin{array}{l} x \leq \frac{4}{3} \\ x \geq \frac{3}{4} \end{array} \right\} \rightarrow \frac{3}{4} \leq x \leq \frac{4}{3}$

$x=2 \rightarrow \sqrt{x-a} + \sqrt{b-x} = 0 \rightarrow a=1$
 $b=4$

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

الف) $y = \sqrt{\frac{x^2-x-4}{x^2-13x^2+34}} \geq 0 \Rightarrow \frac{(x-2)(x+2)}{(x^2-9)(x^2-4)} \geq 0$
 $\frac{-2 \quad -2 \quad 2 \quad 2}{+ \quad - \quad - \quad +}$

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

$\frac{x^2-x-4}{x^2-13x^2+34} \mid x-1$
 $\frac{x^2-x-4}{x^2-13x^2+34} = \frac{-x^2-4}{-12x^2+34}$

$\frac{x^2-x-4}{x^2-13x^2+34} \mid x+1$
 $\frac{x^2-x-4}{x^2-13x^2+34} = \frac{-x^2-4}{-12x^2+34}$

$y = \sqrt{\frac{(x-1)(x^2-x-4)}{(x+1)(x^2-x-4)}} \geq 0 \Rightarrow \frac{(x-1)(x-2)(x+2)}{(x+1)(x^2-x-4)} \geq 0$
 $\frac{-2 \quad -2 \quad -1 \quad 1 \quad 2 \quad 2}{+ \quad - \quad - \quad - \quad + \quad +}$
 $D_f = (-\infty, -2) \cup (-1, 1) \cup (2, +\infty)$

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

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

الف) $y = \sqrt{\frac{x+1}{|x-2|}} + \sqrt{\frac{4-x}{x^2+2x+1}} \geq 0$
 $\frac{4-x \geq 0 \rightarrow x \leq 4}{\frac{x+1}{|x-2|} \geq 0 \rightarrow x \geq -1, x \neq 2}$
 $-1 \leq x \leq 4, x \neq 2$

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