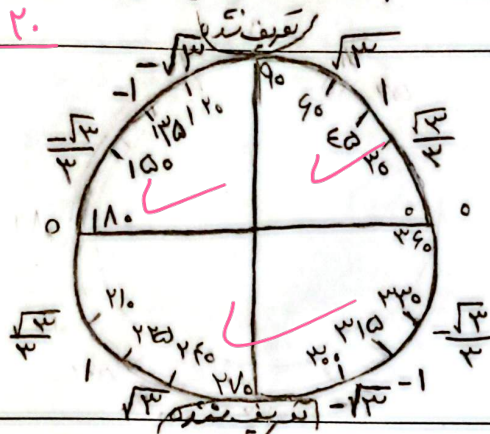


۲۰. آخرین عالی ندر



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

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

ج)  $\cot \frac{2\pi}{3} + 2 \cot \frac{\pi}{3} - 2 \tan \frac{5\pi}{6} = -\frac{1}{\sqrt{3}} + \frac{2}{\sqrt{3}} + \frac{2\sqrt{3}}{1} = \frac{\sqrt{3}}{3} + 2\sqrt{3} = \frac{7\sqrt{3}}{3}$

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

$f(x) = \begin{cases} x^2 + 8x & x \geq a \\ 2x + a + 2 & x \leq a \end{cases}$   $x = a \rightarrow y = a^2 + 8a$   $x = a \rightarrow y = 2a + a + 2$   $a^2 + 8a = 2a + a + 2$

$f(x) = \begin{cases} x^2 + 8x & x \geq 1 \\ 2x + 3 & x \leq 1 \end{cases}$   $x = 1 \rightarrow (1)^2 + 8(1) = 9$   $(a+2)(a-1) = 0$   $a = -2$   $a = 1$

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

$f(x) = \begin{cases} x^2 - b & 1 \leq x \leq -3 \\ a+2x & -2 \leq x \leq -1 \end{cases}$   $x = -3 \rightarrow y = 11 - b$   $x = -3 \rightarrow y = a - 6$   $a - 6 = 11 - b$   $a + b = 17$

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

ب)  $\frac{1}{2x^3 + 6x^2 + 2x + 4} \rightarrow \frac{1}{(2x^2 + 4x + 2)(x+2)} = \frac{1}{2x^2(x+2) + 2(x+2)} = \frac{1}{2(x+2)(x^2+1)}$   $x^2 + 1 \neq 0$   $x^2 \neq -1$   $x \neq \pm i$   $R = \{-i, i\}$

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)  $y = \frac{\sqrt{5-3x}}{\sqrt{4x-3}}$   $5-3x \geq 0 \quad 3x \leq 5 \quad x \leq \frac{5}{3}$   $4x-3 \geq 0 \quad 4x \geq 3 \quad x \geq \frac{3}{4}$

$(-\infty, \frac{5}{3}] \cap (\frac{3}{4}, +\infty) \rightarrow (\frac{3}{4}, \frac{5}{3}]$

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

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

$\frac{b}{3} = \frac{a}{4} = 2$   $a = 8$   $b = 6$

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

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

$[2.5, +\infty)$

الف)  $y = \sqrt{\frac{x+1}{12x-1}} + \sqrt{\frac{4-x}{x^2+2x+5}}$   $\frac{x+1}{12x-1} \geq 0$   $\frac{4-x}{x^2+2x+5} \geq 0$   $x+1=0 \quad x=-1$   $12x-1=0 \quad x=\frac{1}{12}$   $4-x=0 \quad x=4$   $x^2+2x+5=0 \quad \Delta = -12$

$(-\infty, -1) \cup (\frac{1}{12}, +\infty) \cap (-\infty, 4] = (-1, \frac{1}{12}] \cup (\frac{1}{12}, 4]$

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

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