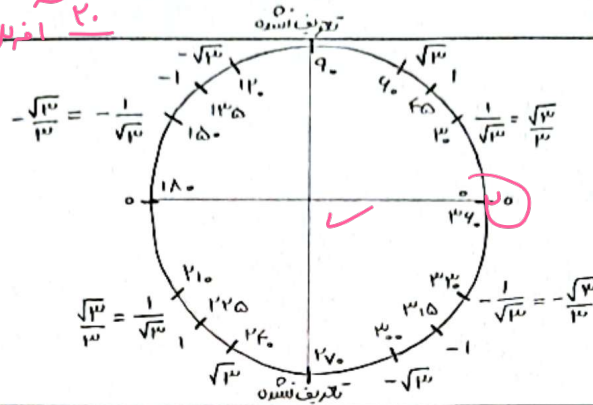


۲. آزمونهای عالی و خوب را کامل و صحیح



۱) $\cos(\sin) + \sin(\cos)$
 $= \cos(0) + \sin(\frac{\pi}{2}) =$
 $1 + 1 = 2$
 $= \boxed{2}$

۲) $\cot \frac{\pi}{3} + \cot \frac{\pi}{6} - \tan \frac{\pi}{4}$
 $= -\frac{\sqrt{3}}{3} + \sqrt{3} - 1$
 $= -\frac{\sqrt{3}}{3} + \frac{3\sqrt{3}}{3} - \frac{3}{3} = \frac{\sqrt{3}}{3}$
 $= \boxed{\frac{\sqrt{3}}{3}}$

۳) $-\cos \frac{\pi}{4} + \sin \frac{\pi}{2} - \sin \frac{\pi}{4}$
 $= -(\frac{\sqrt{2}}{2}) + (1) - (\frac{\sqrt{2}}{2})$
 $= \frac{\sqrt{2}}{2} + \frac{\sqrt{2}}{2} - \frac{2\sqrt{2}}{2} = 0$
 $= \boxed{0}$

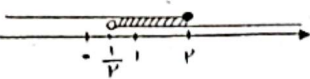
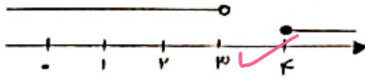
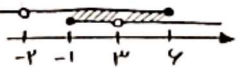
۴) $\sin \frac{\pi}{2} + \cos \pi + \tan \frac{\pi}{4}$
 $= \frac{1}{1} + (-1) + 1(-1) =$
 $\frac{1}{1} - 1 = \frac{1}{1} - \frac{1}{1} = 0$
 $= \boxed{0}$

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

$f(x) = \begin{cases} 2x^2 - b & |x+1| \geq 2 \\ a + 2x & -3 \leq x \leq -1 \end{cases}$
 $|x+1| \geq 2 \rightarrow x+1 \geq 2 \rightarrow x \geq 1$
 $|x+1| \geq 2 \rightarrow x+1 \leq -2 \rightarrow x \leq -3$
 $\rightarrow f(-3) = 2(-3)^2 - b = 2 \times 9 - b = 18 - b$
 $\rightarrow f(-3) = a + 2(-3) = a - 4$
 $18 - b = a - 4 \rightarrow a + b = 18 + 4 = 22 \rightarrow a + b = \boxed{22}$

۱) $y = \frac{1}{2x^3 + x^2 + x + 1}$
 $2x^3 + x^2 + x + 1 = x^2(2x + 1) + (x + 1)$
 $= (2x + 1)(x^2 + 1)$
 $\downarrow$
 -1
 $Df = \mathbb{R} - \{-1\}$

۲) $y = \frac{1}{x^3 - x^2}$
 $x^3 - x^2 \neq 0 \rightarrow x^2(x - 1) \neq 0$
 $\downarrow \quad \downarrow$
 $0 \quad 1$
 $Df = \mathbb{R} - \{0, 1\}$

ب) $y = \frac{\sqrt{4-x^2}}{\sqrt{4x-1^2}} \rightarrow 4-x^2 \geq 0 \rightarrow 4 \geq x^2$ $\sqrt{4x-1^2} \rightarrow x^2 \leq 4 \rightarrow x \leq 2$ $\rightarrow 4x-1^2 > 0 \rightarrow 4x > 1^2 \rightarrow 1^2 x > 1 \rightarrow x > \frac{1}{1^2}$  $Df = (\frac{1}{4}, 2]$	الف) $y = \sqrt{x^2-1} + \sqrt{x-1}$ $x^2-1 \geq 0 \rightarrow x^2 \geq 1 \rightarrow x \geq 1, x \leq -1$ $x-1 \geq 0 \rightarrow x \geq 1$  $Df = [1, +\infty)$	6
$y = \sqrt{4x-a} + \sqrt{b-1^2x} \rightarrow x=1 \rightarrow 4 \times 1 - a = 0 \rightarrow 1^2 - a = 0 \rightarrow a = 1^2$ $Df = \{1\}$ $\rightarrow b - 1^2 \times 1 = 0 \rightarrow b - 4 = 0 \rightarrow b = 4$ $\sim \frac{b}{a} = \frac{4}{1^2} = \frac{1}{1^2} \sim \frac{b}{a} = \boxed{\frac{1}{1^2}}$		7
ب) $y = \frac{\sqrt{x^2-1^2x^2-4x+4}}{x^2+1^2x^2-4x-4} \rightarrow \frac{x^2-1^2x^2-4x+4}{x^2+1^2x^2-4x-4} \geq 0$ $\rightarrow \frac{(x-1)(x^2-x-4)}{(x+1)(x^2+x-4)} = \frac{(x-1)(x-1^2)(x+1)}{(x+1)(x+1^2)(x-1)} \geq 0$ $\frac{-1^2-1-1}{+} - \frac{1}{-} - \frac{1}{-} - \frac{1}{+} +$ $Df = (-\infty, -1) \cup [-1, -1) \cup [1, 1) \cup [1^2, +\infty)$	الف) $y = \frac{\sqrt{x^2-x-4}}{x^2-1^2x^2+1^24} \rightarrow \frac{x^2-x-4}{x^2-1^2x^2+1^24} \geq 0 \rightarrow$ $\frac{(x-1^2)(x+1)}{(x^2-1^2)(x^2+1^2)} = \frac{(x-1^2)(x+1)}{(x+1^2)(x-1^2)(x+1^2)(x-1^2)} \geq 0$ $\frac{-1^2-1^2}{+} - \frac{1^2}{-} - \frac{1^2}{-} - \frac{1^2}{+} +$ $Df = (-\infty, -1^2) \cup (1^2, 1^2) \cup (1^2, +\infty)$	8
ب) $y = \sqrt{1^2[x]-5} \rightarrow 1^2[x]-5 \geq 0$ $\rightarrow [x] \geq \frac{5}{1^2} \rightarrow [x] \geq 1^2, 5$ $\rightarrow x \geq 1^2$ $Df = [1^2, +\infty)$	الف) $y = \sqrt{1^2[x]-4}$ $\rightarrow 1^2[x]-4 \geq 0 \rightarrow 1^2[x] \geq 4 \rightarrow [x] \geq 1^2$ $\rightarrow x \geq 1^2$ $Df = [1^2, +\infty)$	9
ب) $y = \sqrt{[x]-4} + \sqrt{1^2-[x]}$ $[x]-4 \geq 0 \rightarrow [x] \geq 4 \rightarrow x \geq 4$ $1^2-[x] \geq 0 \rightarrow [x] \leq 1^2 \rightarrow x < 1^2$  $Df = \emptyset$	الف) $y = \sqrt{\frac{x+1}{1^2x-1^2}} + \sqrt{\frac{4-x}{x^2+1^2x+4}}$ $\frac{x+1}{1^2x-1^2} \geq 0 \rightarrow$ $\frac{4-x}{x^2+1^2x+4} = \frac{4-x}{(x+1^2)^2} \geq 0$  $Df = [-1, 1) \cup (1, 4]$	10