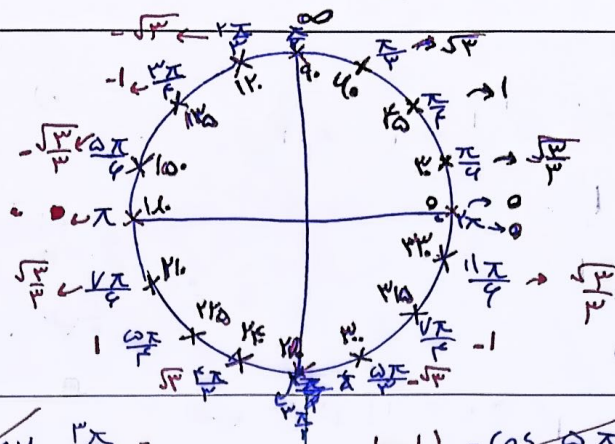




1

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

ب) $-\cos \frac{5\pi}{4} + \sin \frac{4\pi}{\pi} - 3 \sin \frac{\pi}{3}$
 $\frac{5\pi}{4} = 225^\circ \quad +\frac{\sqrt{2}}{2}$
 $\frac{4\pi}{\pi} = 4$
 $\frac{\pi}{3} = 60^\circ \quad +\frac{\sqrt{3}}{2}$
 $-\frac{\sqrt{2}}{2} + 1 - 3 \cdot \frac{\sqrt{3}}{2} = \frac{2 - \sqrt{2} - 3\sqrt{3}}{2}$

2

ج) $\cot \frac{2\pi}{3} + 3 \cot \frac{\pi}{3} - 2 \tan \frac{5\pi}{4}$
 $\frac{2\pi}{3} = 120^\circ \quad -\frac{\sqrt{3}}{3}$
 $\frac{\pi}{3} = 60^\circ \quad +\sqrt{3}$
 $\frac{5\pi}{4} = 225^\circ \quad -1$
 $-\frac{\sqrt{3}}{3} + 3(\sqrt{3}) - 2(-1) = \frac{4\sqrt{3}}{3} + 2$

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

3

$x=a: a^2 + 4a = 2a + 2$
 $a^2 + a - 2 = 0$
 $(a+2)(a-1)$
 $a \neq -2 \Rightarrow a=1$

$f(x) = \begin{cases} x^2 + 2x & x > a \\ 2x + a + 2 & x \leq a \end{cases}$

حال در $x=1$ از معادله داریم
 $\Rightarrow x^2 + 4x: x=1$
 $f(1) = 5$

4

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

$2x^2 - b = a + 2x$
 $11 - b = a - 4$
 $2f = a + b$

5

الف) $\frac{1}{x^3 - 4x^2}$
 $x^3 - 4x^2 > 0$
 $x^2(x-4) > 0$
 $x \in \mathbb{R} - \{0, 4\}$

ب) $\frac{1}{2x^3 + 4x^2 + 2x + 4}$
 $x \neq -2$
 $x^3 + 2x^2 + 2x + 2 \neq 0$
 $(x^3 + 2x^2) + (2x + 2)$
 $x^2(x+2) + 2(x+1)$
 $(x+2)(x^2 + 2) + 2(x+1)$
 $(x+2)(x^2 + 2x + 2) + 2(x+1)$
 $(x+2)(x^2 + 2x + 2) + 2(x+1)$

