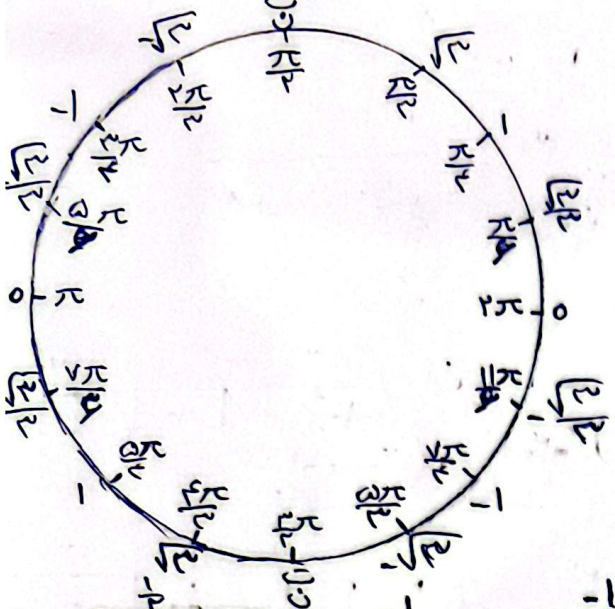




ا) $\sin \frac{\pi}{6} (1) + \cos \pi (1) + 2 \tan \frac{\pi}{6} (1) \Rightarrow \frac{1}{2} - 1 - 2 = \boxed{-\frac{3}{2}}$

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

ج) $\cot \frac{\pi}{4} (1) + 2 \cot \frac{\pi}{4} (1) - 2 \tan \frac{\pi}{6} (1) \Rightarrow \frac{\sqrt{3}}{2} + 2(\frac{\sqrt{3}}{2}) - 2(\frac{1}{2}) = \boxed{\frac{3\sqrt{3}}{2}}$

د) $\cos(\sin \pi) + \sin(\pi \cos \frac{\pi}{6}) \Rightarrow \cos(0) + \sin(\frac{\pi}{2}) \Rightarrow 1 + 1 = \boxed{2}$

$$\left. \begin{matrix} x^2 + 4x & x \geq a \\ 2x + a & x \leq a \end{matrix} \right\} \Rightarrow \left. \begin{matrix} a^2 + 4a \\ 2a + a \end{matrix} \right\} \Rightarrow \left. \begin{matrix} a^2 + 4a = 2a + a \\ a^2 + a - 2 = 0 \end{matrix} \right\} \Rightarrow \frac{(a+2)(a-1)}{-2} \Rightarrow a > 0 \Rightarrow \boxed{1} \quad \text{و} \quad \boxed{-2}$$

$f(x) = \begin{cases} x^2 + 4x & x \geq 1 \\ 2x + 3 & x \leq 1 \end{cases} \Rightarrow f(1) = 2(1) + 3 = \boxed{5}$

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

$\Rightarrow 2(-3)^2 - b = a + 2(-3) \Rightarrow 18 - b = a - 6 \Rightarrow a + b = \boxed{24}$

ا) $y = \frac{1}{x^2 - 4x^2} \Rightarrow x^2 - 4x^2 \neq 0 \Rightarrow x^2(x-4) \Rightarrow \frac{0}{-4} - \frac{4}{-4} + \Rightarrow D_f = \mathbb{R} - \{0, 4\} \quad \text{و} \quad \text{و}$

ب) $y = \frac{1}{2x^2 + 4x^2 + 2x + 4} \Rightarrow 2x^2 + 4x^2 + 2x + 4 \neq 0$

$$\frac{x^2(2x+4) + 1(2x+4)}{2x^2 + 4x^2 + 2x + 4} \Rightarrow \frac{(x^2+1)(2x+4)}{2x^2 + 4x^2 + 2x + 4} \Rightarrow D_f = \mathbb{R} - \{-2\}$$

الف) $y = \sqrt{x^2 - 1} + \sqrt{x - 2} \Rightarrow \begin{cases} x^2 - 1 \geq 0 \\ x - 2 \geq 0 \end{cases} \Rightarrow \begin{cases} x \leq -1 \text{ or } x \geq 1 \\ x \geq 2 \end{cases} \Rightarrow (-\infty, -1] \cup [2, +\infty) \cup [2, +\infty) \Rightarrow \boxed{[2, +\infty)}$

ب) $y = \frac{\sqrt{6-3x}}{\sqrt{6x-3}} \Rightarrow \frac{1}{\frac{1}{\sqrt{6x-3}}} \Rightarrow \frac{1}{\frac{1}{\sqrt{6x-3}}} \Rightarrow \left(\frac{1}{2}, +\infty \right) \cup (-\infty, 2] \Rightarrow \boxed{(\frac{1}{2}, 2]}$

