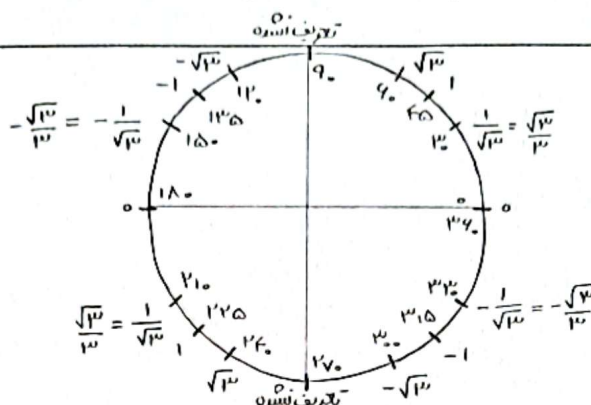




د)  $\cos(\sin \theta) + \sin(\theta \cos \frac{\pi}{4})$   
 $= \cos(0) + \sin(\frac{\pi}{4}) =$   
 $1 + 1 = 2$   
 $= \boxed{2}$

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

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

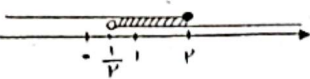
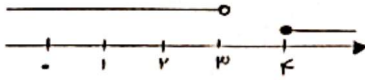
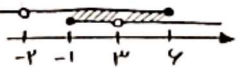
الف)  $\sin \frac{\pi}{4} + \cos \pi + \tan \frac{\pi}{4}$   
 $= \frac{1}{\sqrt{2}} + (-1) + 1(-1) =$   
 $\frac{1}{\sqrt{2}} - 1 = \frac{1}{\sqrt{2}} - \frac{\sqrt{2}}{\sqrt{2}} = -\frac{\sqrt{2}-1}{\sqrt{2}}$   
 $= \boxed{-\frac{\sqrt{2}-1}{\sqrt{2}}}$

$f(x) = \begin{cases} x^2 + 4x & x \geq a \\ 2x + a + 2 & x \leq a \end{cases} \rightarrow x = a \rightarrow f(x) = a^2 + 4a$   
 $\rightarrow a^2 + 4a = 2a + a + 2 \rightarrow a^2 + 4a - 2a - a - 2 = 0$   
 $\rightarrow a^2 + a - 2 = 0 \rightarrow (a+2)(a-1) = 0$   
 $\rightarrow a = -2 \text{ یا } a = 1 \text{ (با توجه به } a > 0) \rightarrow a = 1$   
 $f(1) = 1^2 + 4 \times 1 = 1 + 4 = 5$   
 $\rightarrow f(1) = \boxed{5}$

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

ب)  $y = \frac{1}{2x^3 + 4x^2 + 2x + 4}$   
 $2x^3 + 4x^2 + 2x + 4 = x^2(2x + 4) + (2x + 4)$   
 $= (2x + 4)(x^2 + 1) \neq 0$   
 $\downarrow$   
 $-2$   
 $D_f = \mathbb{R} - \{-2\}$

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

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |    |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| <p>ب) <math>y = \frac{\sqrt{4-x^2}}{\sqrt{4x-1^2}} \rightarrow 4-x^2 \geq 0 \rightarrow 4 \geq x^2</math><br/> <math>\sqrt{4x-1^2} \rightarrow x^2 \leq 4 \rightarrow x \leq 2</math></p> <p><math>\rightarrow 4x-1^2 &gt; 0 \rightarrow 4x &gt; 1^2 \rightarrow 1^2 x &gt; 1 \rightarrow x &gt; \frac{1}{1^2}</math></p>  <p><math>Df = (\frac{1}{1^2}, 2]</math></p>            | <p>الف) <math>y = \sqrt{x^2-1} + \sqrt{x-1^2}</math><br/> <math>x^2-1 \geq 0 \rightarrow x^2 \geq 1 \rightarrow x \geq 1, x \leq -1</math><br/> <math>x-1^2 \geq 0 \rightarrow x \geq 1^2</math></p>  <p><math>Df = [1^2, +\infty)</math></p>                                                                                                                                                                     | 6  |
| <p><math>y = \sqrt{4x-a} + \sqrt{b-1^2x} \rightarrow x=1^2 \rightarrow 4 \times 1^2 - a = 0 \rightarrow 1^2 - a = 0 \rightarrow a = 1^2</math><br/> <math>Df = \{1^2\}</math><br/> <math>\rightarrow b - 1^2 \times 1^2 = 0 \rightarrow b - 4 = 0 \rightarrow b = 4</math></p> <p><math>\sim \frac{b}{a} = \frac{4}{1^2} = \frac{1}{1^2} \sim \frac{b}{a} = \boxed{\frac{1}{1^2}}</math></p>                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 7  |
| <p>ب) <math>y = \frac{\sqrt{x^2-1^2x^2-ax+4}}{x^2+1^2x^2-ax-4} \rightarrow \frac{x^2-1^2x^2-ax+4}{x^2+1^2x^2-ax-4} \geq 0</math><br/> <math>\rightarrow \frac{(x-1)(x^2-x-4)}{(x+1)(x^2+x-4)} = \frac{(x-1)(x-1^2)(x+1^2)}{(x+1)(x+1^2)(x-1^2)} \geq 0</math></p> <p><math>\frac{-1^2-1^2-1}{+} \frac{-1^2-1^2-1}{-} \frac{1^2-1^2-1}{+} \frac{1^2-1^2-1}{-}</math></p> <p><math>Df = (-\infty, -1^2) \cup [-1^2, -1) \cup [1, 1^2) \cup [1^2, +\infty)</math></p> | <p>الف) <math>y = \frac{\sqrt{x^2-x-4}}{x^2-1^2x^2+1^2x} \rightarrow \frac{x^2-x-4}{x^2-1^2x^2+1^2x} \geq 0 \rightarrow</math><br/> <math>\frac{(x-1^2)(x+1^2)}{(x^2-1^2)(x-1^2)} = \frac{(x-1^2)(x+1^2)}{(x+1^2)(x-1^2)(x+1^2)(x-1^2)} \geq 0</math></p> <p><math>\frac{-1^2-1^2-1}{+} \frac{-1^2-1^2-1}{-} \frac{1^2-1^2-1}{+} \frac{1^2-1^2-1}{-}</math></p> <p><math>Df = (-\infty, -1^2) \cup (1^2, 1^2) \cup (1^2, +\infty)</math></p>                                                        | 8  |
| <p>ب) <math>y = \sqrt{1^2[x]-a} \rightarrow 1^2[x]-a \geq 0</math><br/> <math>\rightarrow [x] \geq \frac{a}{1^2} \rightarrow [x] \geq 1^2, a</math><br/> <math>\rightarrow x \geq 1^2</math></p> <p><math>Df = [1^2, +\infty)</math></p>                                                                                                                                                                                                                           | <p>الف) <math>y = \sqrt{1^2[x]-4}</math><br/> <math>\rightarrow 1^2[x]-4 \geq 0 \rightarrow 1^2[x] \geq 4 \rightarrow [x] \geq 1^2</math><br/> <math>\rightarrow x \geq 1^2</math></p> <p><math>Df = [1^2, +\infty)</math></p>                                                                                                                                                                                                                                                                      | 9  |
| <p>ب) <math>y = \sqrt{[x]-4} + \sqrt{1^2-[x]}</math><br/> <math>[x]-4 \geq 0 \rightarrow [x] \geq 4 \rightarrow x \geq 4</math><br/> <math>1^2-[x] \geq 0 \rightarrow [x] \leq 1^2 \rightarrow x &lt; 1^2</math></p>  <p><math>Df = \emptyset</math></p>                                                                                                                        | <p>الف) <math>y = \sqrt{\frac{x+1}{ x-1^2 }} + \sqrt{\frac{4-x}{x^2+1^2x+4}}</math><br/> <math>\frac{x+1}{ x-1^2 } \geq 0 \rightarrow \frac{-1^2+1^2}{-} \frac{1^2+1^2}{+} \frac{1^2+1^2}{-}</math><br/> <math>\frac{4-x}{x^2+1^2x+4} = \frac{4-x}{(x+1^2)^2} \geq 0</math><br/> <math>\frac{1^2-1^2-1}{+} \frac{1^2-1^2-1}{-} \frac{1^2-1^2-1}{+}</math></p>  <p><math>Df = [-1, 1^2) \cup (1^2, 4]</math></p> | 10 |