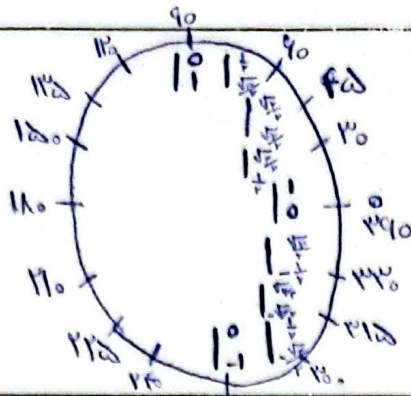




$$\begin{aligned} \tan 0^\circ &= 0, \tan 18^\circ = 1, \tan 36^\circ = \frac{\sqrt{3}}{3}, \tan 54^\circ = \frac{\sqrt{3}}{3}, \tan 72^\circ = 1, \tan 90^\circ = \sqrt{3}, \tan 108^\circ = \sqrt{3}, \tan 126^\circ = 1, \tan 144^\circ = -1, \tan 162^\circ = -1, \tan 180^\circ = 0, \tan 198^\circ = 0, \tan 216^\circ = 1, \tan 234^\circ = 1, \tan 252^\circ = -1, \tan 270^\circ = -\sqrt{3}, \tan 288^\circ = -\sqrt{3}, \tan 306^\circ = -1, \tan 324^\circ = -1, \tan 342^\circ = 1, \tan 360^\circ = 1 \end{aligned}$$

$$\tan z = \frac{\sin z}{\cos z}$$

$$\begin{aligned} \text{الف) } \sin \frac{\pi}{4} + \cos \pi + 2 \tan \frac{\pi}{4} &\rightarrow \frac{1}{\sqrt{2}} + (-1) + 2(-1) \rightarrow -3 + \frac{1}{\sqrt{2}} = \frac{-2\sqrt{2}}{\sqrt{2}} \\ \text{ب) } -\cos \frac{5\pi}{4} + \sin \frac{\pi}{3} - 3 \sin \frac{\pi}{6} &\rightarrow \frac{\sqrt{2}}{2} + \left(\frac{\sqrt{3}}{2}\right) - 3\left(-\frac{\sqrt{2}}{2}\right) = \frac{\sqrt{2} + 3\sqrt{2} + \sqrt{3}}{2} = \frac{4\sqrt{2} + \sqrt{3}}{2} \\ \text{ج) } \cos \frac{\pi}{4} + 3 \cos \frac{\pi}{3} - 2 \tan \frac{5\pi}{4} &= \frac{\sqrt{2}}{2} + 3\left(\frac{\sqrt{2}}{2}\right) - 2\left(-\frac{\sqrt{2}}{2}\right) = \frac{4\sqrt{2}}{2} \\ \text{د) } \cos(\sin \pi) + \sin(\pi \cos \frac{\pi}{4}) &= 1 + 1 = 2 \end{aligned}$$

$$f(x) = \begin{cases} x^2 + 4x & x \geq a \\ 2x + a + 2 & x < a \end{cases} \quad \begin{aligned} a^2 + 4a &= 2a + a + 2 \\ a^2 + 2a - 2 &= 0 \rightarrow a^2 + a - 2 = 0 \rightarrow a = 1, a = -2 \end{aligned}$$

$$\begin{cases} x^2 + 4x & x \geq 1 \\ 2x + 3 & x < 1 \end{cases} \rightarrow 1 + f(1) = 5 \quad \text{جواب: } f(1) = 5$$

$$f(x) = \begin{cases} 2x^2 - b & |x+1| \geq 2 \\ a + 2x & -3 \leq x < -1 \end{cases} \quad \text{if } x = -3 \rightarrow \begin{cases} 2(9) - b = a - 4 \\ 11 - b = a - 4 \\ a + b = 24 \end{cases}$$

$$\begin{aligned} \text{الف) } y &= \frac{1}{x^2 - 4x^2} \rightarrow x^2 - 4x^2 \neq 0 \rightarrow x^2(x - 4) \neq 0 \rightarrow x \neq 0, x \neq 4 \\ \text{ب) } y &= \frac{1}{2x^2 + 4x^2 + 2x + 6} \end{aligned}$$

$$\begin{aligned} 2x^2(x+2) + 2(x+2) &\rightarrow 2(x+2)(x^2+1) \\ x+2 \neq 0 & \quad x \neq -2 \\ x^2+1 \neq 0 & \quad x^2 \neq -1 \end{aligned}$$

الف) $y = \sqrt{x^2-1} + \sqrt{x-2}$ $x^2-1 \geq 0$ $x^2 \geq 1$ $x \geq 1$ و $x \leq -1$ $x-2 \geq 0$ $x \geq 2$ $D_f = [2, +\infty)$ ب) $y = \frac{\sqrt{4-3x}}{\sqrt{4x-3}}$ $4-3x \geq 0$ $4 \geq 3x$ $\frac{4}{3} \geq x$ $4x-3 \geq 0$ $4x \geq 3$ $x \geq \frac{3}{4}$ } $D_f = [\frac{3}{4}, \frac{4}{3}]$	٦
$4x-a \geq 0 \rightarrow x \geq \frac{a}{4}$ $\frac{a}{4} = 2 \rightarrow a = 8$ $\frac{b}{a} = \frac{1}{2}$ $b-3x \geq 0 \rightarrow x \leq \frac{b}{3}$ $\frac{b}{3} = 2 \rightarrow b = 6$	٧
الف) $y = \sqrt{\frac{x^2-x-9}{x^2-13x^2+49}}$ $\frac{x^2-x-9}{x^2-13x^2+49} \geq 0$ $\frac{(x+2)(x-3)}{(x-7)(x-9)} \geq 0$ $\frac{-2}{+} \frac{+}{-} \frac{-}{-} \frac{+}{+}$ $x^2=t \rightarrow t^2-13t+49$ $t=7 \rightarrow x^2=7 \rightarrow x = \pm\sqrt{7}$ $t=9 \rightarrow x^2=9 \rightarrow x = \pm 3$ $D_f = (-\infty, -3) \cup (2, 3) \cup (7, +\infty)$ ب) $y = \sqrt{\frac{x^2-2x^2-2x+9}{x^2+2x^2-2x-9}}$ $\frac{(x-1)(x+2)(x-3)}{(x+1)(x+2)(x+3)} \geq 0$ $\frac{-1}{+} \frac{+}{-} \frac{-}{-} \frac{+}{+}$ $\frac{-1}{+} \frac{-}{-} \frac{+}{+} \frac{-}{-} \frac{+}{+}$ $D_f = (-\infty, -3) \cup [-2, -1) \cup [1, 2) \cup [3, +\infty)$	٨
الف) $y = \sqrt{2[x]-4}$ $2[x]-4 \geq 0$ $[x] \geq 2 \rightarrow D_f = [2, +\infty)$ ب) $y = \sqrt{2[x]-2}$ $2[x]-2 \geq 0$ $2[x] \geq 2$ $[x] \geq \frac{2}{2} = 1$ $[x] \geq 1 \rightarrow D_f = [1, +\infty)$	٩
الف) $y = \sqrt{\frac{x+1}{ x-1 }} + \sqrt{\frac{4-x}{x^2+2x+1}}$ $\frac{x+1}{ x-1 } \geq 0$ $\frac{-1}{-} \frac{+}{+}$ $x \geq -1$ $x \neq 1$ $\frac{4-x}{(x+1)^2} \geq 0$ $\frac{-1}{+} \frac{+}{+}$ $x \leq 4$ $x \neq -1$ $D_f = (-1, 4) \cup (4, +\infty)$ ب) $y = \sqrt{[x]-1} + \sqrt{2-[x]}$ $[x]-1 \geq 0$ $[x] \geq 1 \rightarrow D_f = [1, +\infty)$ $2-[x] \geq 0$ $2 \geq [x] \rightarrow D_f = (-\infty, 2)$ $D_f = \emptyset$	١٠