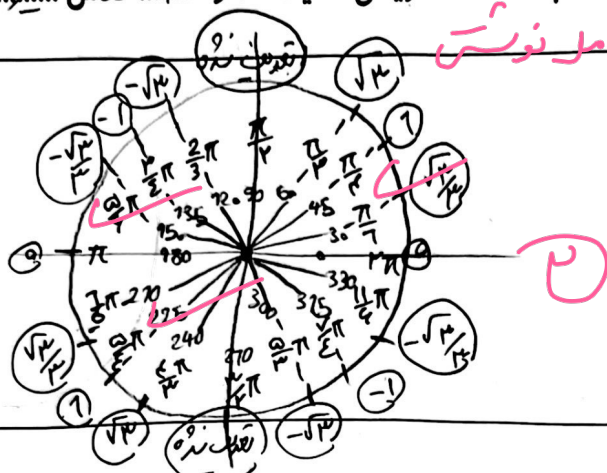




الف) $\sin \frac{\pi}{4} = \frac{1}{\sqrt{2}}$, $\cos \pi = -1$, $\tan \frac{\pi}{4} = 1 \Rightarrow \frac{1}{\sqrt{2}} + (-1) + 2(-1) = \frac{1}{\sqrt{2}} - 1 - 2 = -\frac{3}{\sqrt{2}}$

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

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

د) $\sin \pi = 0 \Rightarrow \cos(\sin \pi) = \cos(0) = 1$ $\cos \frac{\pi}{4} = \frac{1}{\sqrt{2}} \Rightarrow \sin(\pi \cos \frac{\pi}{4}) = \sin(\frac{\pi}{\sqrt{2}}) = 1$

$a^2 + 2a = 2a + a + 2 \Rightarrow a^2 + 2a = 3a + 2 \Rightarrow a^2 + a - 2 = 0$

$(a+2)(a-1) = 0 \Rightarrow a = 1$ $a = -2$

$\Rightarrow a > 0 \Rightarrow f(a) \Rightarrow f(1) = 1^2 + (1)(1) = 2$

$|x+1| \geq 2 \Rightarrow x+1 \geq 2 \Rightarrow x \geq 1$ $x+1 \leq -2 \Rightarrow x \leq -3 \Rightarrow -3 \leq x \leq -1$

$x = -3: 2(-3)^2 - b = 2(9) - b = 18 - b$

$x = -1: a + 2(-1) = a - 2$

$18 - b = a - 2 \Rightarrow a + b = 20$

الف) $x^3 - 4x^2 = 0 \Rightarrow x^2(x-4) = 0 \Rightarrow x = 0$ $x = 4$

$D_f = \mathbb{R} - \{0, 4\}$

ب) $2x^3 - 4x^2 + 2x + 4 = 2x^2(x+2) + 2(x+2) = (2x^2+2)(x+2) = 0$

$2x^2 + 2 = 0 \Rightarrow x^2 + 1 = 0 \Rightarrow x = \pm i$ $D_f = \mathbb{R} - \{-1\}$

$$\begin{aligned} \text{الف)} \quad x^2 - 1 \geq 0 &\Rightarrow x^2 \geq 1 \Rightarrow x \geq 1 \quad \vee \quad x \leq -1 \\ x - 2 \geq 0 &\Rightarrow x \geq 2 \end{aligned} \quad \left. \vphantom{\begin{aligned} x^2 - 1 \geq 0 \\ x - 2 \geq 0 \end{aligned}} \right\} \cap \Rightarrow D_f = [2, +\infty) \checkmark$$

$$\begin{aligned} \text{ب)} \quad 4 - 3x \geq 0 &\Rightarrow 3x \leq 4 \Rightarrow x \leq \frac{4}{3} \\ 4x - 1 > 0 &\Rightarrow 4x > 1 \Rightarrow x > \frac{1}{4} \end{aligned} \quad \left. \vphantom{\begin{aligned} 4 - 3x \geq 0 \\ 4x - 1 > 0 \end{aligned}} \right\} \cap \Rightarrow D_f = \left(\frac{1}{4}, \frac{4}{3} \right] \checkmark$$

$$\begin{aligned} 4x - a \geq 0 &\Rightarrow x \geq \frac{a}{4} \\ b - 3x \geq 0 &\Rightarrow x \leq \frac{b}{3} \end{aligned} \quad \left. \vphantom{\begin{aligned} 4x - a \geq 0 \\ b - 3x \geq 0 \end{aligned}} \right\} \rightarrow D_f = \left[\frac{a}{4}, \frac{b}{3} \right] \Rightarrow \begin{cases} \frac{a}{4} = 2 \Rightarrow a = 8 \\ \frac{b}{3} = 2 \Rightarrow b = 6 \end{cases}$$

$\downarrow$
 $\frac{b}{a} = \frac{6}{8} = \frac{3}{4}$

$$P(x) = \frac{x^2 - x - 4}{x^2 - 13x^2 + 44} \geq 0 \Rightarrow x^2 - x - 4 = (x-3)(x+2)$$

$$x^2 - 13x^2 + 44 = (x^2 - 4)(x^2 - 9) = (x-2)(x+2)(x-3)(x+3)$$

$$P(x) = \frac{(x-3)(x+2)}{(x-2)(x+2)(x-3)(x+3)} \stackrel{\omega \approx}{=} \frac{1}{(x-2)(x+3)}$$

Sign chart for $P(x)$:

$x < -3$	$-3 < x < -2$	$-2 < x < 2$	$2 < x < 3$	$x > 3$
+	-	+	-	+

$x \neq -2 \Rightarrow D_f = (-\infty, -2) \cup (-2, 2) \cup (2, +\infty)$

$$\begin{aligned} \text{الف)} \quad 2[x] - 4 \geq 0 &\Rightarrow 2[x] \geq 4 \Rightarrow [x] \geq 2 \\ [x] \geq n &\Rightarrow n \geq n \quad [x] \geq 2 \Rightarrow n \geq 2 \end{aligned} \quad D_f = [2, +\infty)$$

$$\text{ب)} \quad 2[x] - 5 \geq 0 \Rightarrow 2[x] \geq 5 \Rightarrow [x] \geq \frac{5}{2} \Rightarrow [x] \geq 2.5 \Rightarrow$$

$[x] \geq 3 \Rightarrow n \geq 3$
 $D_f = [3, +\infty)$

$$\begin{aligned} \text{الف)} \quad x \neq 3 &\Rightarrow |x-3| \neq 0 \\ D_1 &= [-1, 4) \cup (4, +\infty) \rightarrow \text{دست چپ} \\ \Delta &= 2^2 - 4(1)(4) = -12 < 0 \Rightarrow \text{همواره برای تمام اعداد حقیقی مثبت است.} \\ D &: D_1 = (-\infty, 4] \\ D_2 &= \emptyset \end{aligned}$$

$\left. \begin{aligned} [x] \geq 4 \\ 2 - [x] \geq 0 \Rightarrow [x] \leq 2 \end{aligned} \right\} \Rightarrow \text{هیچ عددی نتواند باشد} \\ D_f = \emptyset$

$D_1 \cap D_2 \rightarrow [-1, 4] - \{3\}$

٨- ب. $\Leftarrow$ مجموع ضرب ها = ٥ . $1-2-5+4=0$ سی $x=1$ یک ریشه است .

$$x^3 - 2x^2 - 5x + 4 = (x-1)(x^2 - x - 4) = (x-1)(x-2)(x+2)$$

$$x = -1$$

$$\frac{(-1)^2}{-1} + \frac{r(-1)^2}{1} - \frac{2(-1)}{0} - 4 = 0 \rightarrow x = -1 \rightarrow \underline{\underline{-2}}$$

$$P(x) = \frac{(x-1)(x-2)(x+2)}{(x+1)(x+3)(x-4)} \geq 0$$

$$+ \frac{-r}{j} - \frac{-r}{j} + \frac{-1}{j} - \frac{1}{j} + \frac{r}{j} - \frac{r}{j} +$$

$$\Rightarrow D_f = (-\infty, -r) \cup [-r, -1) \cup [1, r) \cup [r, +\infty)$$