

①

$$f(x) = x^4 + 1 + 2x + 9x^3 + 1 - 4x + mx^3 + nx + mn \Rightarrow 10x^3 + mx^3 - 5x + nx + mn$$

چون تابع
تابع است $\Rightarrow x$ با این ضرایب $\Rightarrow m = -10, n = 5$

$$m = p+1 \Rightarrow -10 = p+1 \Rightarrow p = -11 \quad -1 = p+k \Rightarrow -1 = -11+k \Rightarrow k = 10$$

$$\Rightarrow m+n+p+k = 5-10+(-11)+10 = -5$$

ریشه‌های صورت = ۲

$$f'(x) = 4x^3 - 10 \Rightarrow (x-10)(x+10) \Rightarrow \begin{cases} x^3 = -10 \\ x^3 = 10 \end{cases} \Rightarrow x = \pm \sqrt[3]{10}$$

$\Rightarrow$ عبارت $\Rightarrow \frac{-10}{x} + \frac{10}{x} \Rightarrow D_f = (-10, +\infty) - \{\pm \sqrt[3]{10}\}$

ب) $5-2[-x] \neq 0 \Rightarrow 2[-x] \neq 5 \Rightarrow [-x] \neq 2.5 \Rightarrow x \neq [-2.5, -2]$

$$\Rightarrow D_f = R - (-2.5, -2]$$

ا) $x(x^3-1) \geq 0 \Rightarrow \frac{-1 \quad 0 \quad 1}{-1 \quad + \quad -1 \quad +} \xrightarrow{n} [1, +\infty) \cup D_f$

$|x|+x \geq 0 \Rightarrow \frac{0}{-1 \quad +}$

ب) $|x-2|-x^3 \geq 0 \Rightarrow \begin{cases} x \geq 2 \Rightarrow x-2-x^3 \geq 0 \Rightarrow \Delta < 0 \Rightarrow \text{no solution} \\ x < 2 \Rightarrow -x+2-x^3 < 0 \Rightarrow \frac{-2 \quad 1}{-1 \quad +} \Rightarrow [-2, 1] \end{cases}$

$|x|-1 \neq 0 \Rightarrow x \neq \pm 1$

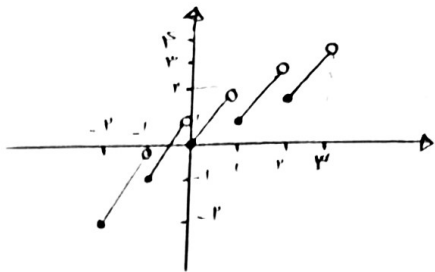
$$\Rightarrow D_f = [-2, 1] - \{\pm 1\}$$

$||x-2|-1|-k = 0 \Rightarrow ||x-2|-1| = k \Rightarrow \begin{cases} |x-2|-1 = k \Rightarrow |x-2| = k+1 \Rightarrow \begin{cases} x-2 = k+1 \\ x-2 = -k-1 \end{cases} \\ |x-2|-1 = -k \Rightarrow |x-2| = -k+1 \Rightarrow \begin{cases} x-2 = -k+1 \\ x-2 = k-1 \end{cases} \end{cases}$

$\Rightarrow \begin{cases} x = k+3 \\ x = -k+1 \\ x = -k+3 \\ x = k+1 \end{cases}$

$$\Rightarrow k+3 = -k+3 \Rightarrow k = -3$$

④



$$\begin{aligned} x=1 &\rightarrow \frac{1-\sqrt{1}+1^2+b+ab}{1+a} = 1 \Rightarrow a-b=ab-1 \\ x=\sqrt{1} &\rightarrow \frac{\sqrt{1}-1+1^2+1b+ab}{1+a} = \sqrt{1} \Rightarrow \sqrt{1}b-1a = -ab+1 \end{aligned} \quad \left\{ \begin{array}{l} + \\ + \end{array} \right. \Rightarrow \begin{array}{l} b-a=\sqrt{1} \Rightarrow \underline{a-b=-\sqrt{1}} \\ b-a=\sqrt{1} \Rightarrow \underline{a-b=-\sqrt{1}} \end{array}$$

$$x=0 \rightarrow \frac{-1}{-1} = 0+C \Rightarrow \underline{C=1}$$

$$\begin{aligned} x=1 &\rightarrow \frac{a+1}{1+b} = 1+\sqrt{1} \Rightarrow 1+1^2b=a+1 \\ x=-1 &\rightarrow \frac{-a+1}{-1+b} = -1+\sqrt{1} \Rightarrow -1+b = -a+1 \end{aligned} \quad \left\{ \begin{array}{l} + \\ + \end{array} \right. \Rightarrow \begin{array}{l} 1+1^2b=\sqrt{1} \Rightarrow \underline{b=\frac{1}{\sqrt{1}}} \\ 1+1^2b=\sqrt{1} \Rightarrow \underline{b=\frac{1}{\sqrt{1}}} \end{array}$$

$$\Rightarrow b+C = \underline{1, a}$$

$$\sqrt{1-\sqrt{1}a} + 1^2k - \sqrt{1} - (\sqrt{1-b-\sqrt{1}} + 1^2k) = k \Rightarrow -k - \sqrt{1} = k \Rightarrow \underline{k=-1}$$

$\downarrow$ $a = \frac{\sqrt{1}}{\sqrt{1}}$ $\downarrow$ $b = \sqrt{1}$

$$\Rightarrow \sqrt{1} - \sqrt{1} - (-1) = \underline{1}$$

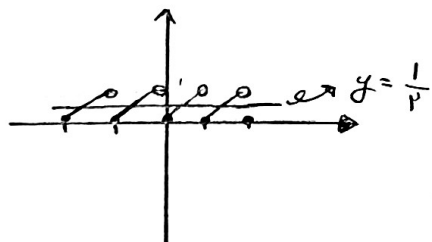
$$D_{g_1} = [-1, +\infty)$$

$$\Rightarrow D_{g_1} = (-\infty, \sqrt{1}] \Rightarrow m-x \geq 0 \Rightarrow \underline{m=\sqrt{1}}$$

$$\sqrt{1}-g(x) = 4\sqrt{1} \Rightarrow \sqrt{1-\sqrt{1}} + n - \sqrt{1}$$

$$\Rightarrow 1+n-1\sqrt{1} = 4\sqrt{1} \Rightarrow \underline{n = -1+4\sqrt{1}}$$

$$\Rightarrow \underline{m+n = 2+4\sqrt{1}}$$



$\Rightarrow$ جواب $\sqrt{1}$ جواب $\sqrt{1}$