

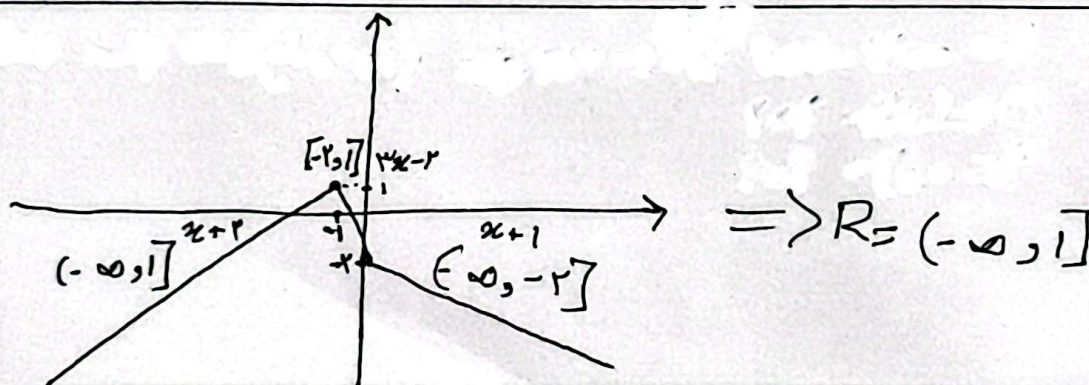
$$\begin{aligned} & \{x \mid x^3 - 1 = 0\} \Rightarrow x^3 - 1 = (x-1)(x^2+x+1) = 0 \\ & \Rightarrow x = 1 \text{ or } x^2+x+1 = 0 \\ & \Rightarrow R = \{1, \omega, \omega^2\} \end{aligned}$$

$$\begin{aligned} f(x) &= x^3 - 1 \xrightarrow{D_f = [1, \infty)} x^3 - 1 = 0 \Rightarrow R_f = [1, \infty) \\ g(x) &= \frac{1}{x} \xrightarrow{D_g = (-\infty, 0) \cup (0, \infty)} \frac{1}{x} = 1 \Rightarrow R_g = (-\infty, 1) \\ &\Rightarrow R_f \cup R_g \rightarrow (-\infty, 1] \cup [1, \infty) \end{aligned}$$

$$\begin{aligned} & \Rightarrow \left(\frac{-b}{2a}\right) = \frac{-1}{2(-\frac{1}{4})} = 2 \Rightarrow y_v = -\frac{1}{4}(2)^2 + 1 + 3 = 3 \Rightarrow (2, 3) \\ & y > \frac{3}{4} \Rightarrow -\frac{1}{4}x^2 + x + 3 > \frac{3}{4} \Rightarrow -x^2 + 4x + 9 > 0 \Rightarrow x^2 - 4x - 9 < 0 \\ & \Rightarrow \frac{-1}{4} \pm \sqrt{\frac{1}{16} + \frac{9}{4}} \Rightarrow -1 < x < 5 \Rightarrow (-1, 5) = (a, b) \\ & \Rightarrow \sqrt{b-a} = \sqrt{5-(-1)} = \sqrt{6} = 2 \end{aligned}$$

$$\begin{aligned} & \Rightarrow y = |x-1| + |x+3| + 2|x-2| \\ & \begin{aligned} & \xrightarrow{x \leq 1} y = (1-x) + (x+3) + 2(2-x) \\ & \Rightarrow y = 1-4x \xrightarrow{\text{نزولی}} x=1 \rightarrow y=1-4=-3 \text{ (1)} \\ & \xrightarrow{1 < x \leq 2} y = 4-2x \xrightarrow{\text{نزولی}} x=2 \rightarrow y=4-4=0 \text{ (2)} \\ & \xrightarrow{2 < x \leq 3} y = 2x-2 \xrightarrow{\text{صورتی}} x=2 \rightarrow y=2-2=0 \text{ (3)} \end{aligned} \end{aligned}$$

① ② ③ یکپسین نقطه



$$\Rightarrow y = x + 1 + \frac{m-1}{x+1} \Rightarrow x \neq -1 \quad x(x+1) \rightarrow x^2 + (\Delta - y)x + (m - y) = 0$$

برای اینکه $\Delta \geq 0$ باید $y \in \mathbb{R}$ $\Delta = y^2 - 10y + 15 + 4y - 4m = y^2 - 6y + 15 - 4m = g(y)$: $\Delta \geq 0$

$$g(y) \geq 0 \Rightarrow \text{فربل مست} \Rightarrow (-4)^2 - 4(1)(15 - 4m) \leq 0 \Rightarrow 16m - 44 \leq 0$$

$$\Rightarrow \underline{m \leq 11} \rightarrow \underline{\text{بی نهایت مقدار برای } m}$$

$$x < 0 \Rightarrow -x + 1 \Rightarrow R = (1, +\infty) \quad ①$$

$$0 < x < 1 \Rightarrow (x-1)^2 + 1 \xrightarrow{\text{کینه}} x = 1 \xrightarrow{\text{بیشه}} x \rightarrow 1 \Rightarrow R = [1, 5) \quad ②$$

$$x \geq 1 \Rightarrow x + 1 \Rightarrow R = [5, +\infty) \quad ③$$

$$\underline{①, ②, ③} \Rightarrow (1, +\infty) \cup [1, 5) \cup [5, +\infty) = \underline{[1, +\infty)}$$

$$x < 0 \Rightarrow x^2 + 4x + 3 = (x+1)(x+3) \xrightarrow{\text{مورقان}} x = -2 \text{ محقق}$$

$$\Rightarrow (-2)^2 + 4(-2) + 3 = -1 \text{ کینه} \Rightarrow R = [-1, +\infty) \quad ①$$

$$x > 0 \Rightarrow f(x) = [2x] - 2x \xrightarrow{\text{نیمه}} 2x = n + \theta \Rightarrow f(x) = n - (n + \theta) = -\theta \quad ②$$

$$\Rightarrow 0 \leq \theta < 1$$

$$\underline{①, ②} \Rightarrow R_f = [-1, +\infty)$$

$$\xrightarrow{\text{رادیکال}} 2x + 3 \geq 0 \Rightarrow x \geq -\frac{3}{2} \Rightarrow D = [-\frac{3}{2}, +\infty)$$

$$\Rightarrow b = -\frac{3}{2} \leftarrow x \text{، بیشینه}$$

$$y_{\max} = a + 1 - 0 = a + 1 = 5 \Rightarrow a = 4 \Rightarrow ab = 4 \times \frac{-3}{2} = -6$$

$$\xrightarrow{\text{رادیکال}} 1 - x \geq 0 \text{ و } x + 1 \geq 0 \Rightarrow R = [-1, 1] \xrightarrow{\text{نیمه}} a = \sqrt{x+1}, b = \sqrt{1-x} \quad (x \geq 0)$$

$$a^2 + b^2 = 2 \Rightarrow f(x) = 2a + 4b, g(x) + f(x) = 3(a+b) = S(x)$$

$$y = \frac{f(x)}{4} - \frac{g(x)}{3} = \frac{f(x)}{4} - \frac{S(x) - f(x)}{3} = a + 4b - (a+b) = b \Rightarrow y = \sqrt{1-x}$$

$$\xrightarrow{\text{نیمه}} x \in [-1, 1] \Rightarrow y = \sqrt{1-x} \in [\sqrt{1-1}, \sqrt{1-(-1)}] = [0, \sqrt{2}]$$

$$R = [0, \sqrt{2}]$$