

$$\sin^2\left(x + \frac{\pi}{2}\right) \begin{matrix} \text{max} \\ 1 \\ \text{min} \\ 0 \end{matrix}$$

$$\Rightarrow y \sin^2\left(x + \frac{\pi}{2}\right) - 1 \begin{matrix} \text{max} \\ y - 1 = 1 \\ 0 - 1 = -1 \end{matrix} \quad (1)$$

P

$$R_f = [-1, 1]$$

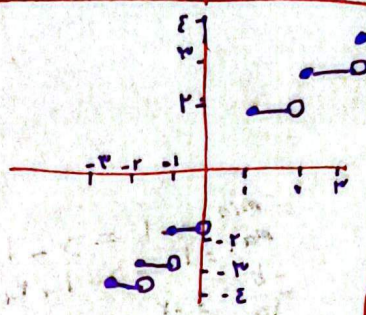
$$\cos^2 x \begin{matrix} \text{max} \\ 1 \\ \text{min} \\ -1 \end{matrix} \Rightarrow$$

$$y \cos^2 x - \varepsilon \begin{matrix} \text{max} \\ y - \varepsilon = -1 \\ -y - \varepsilon = -v \end{matrix}$$

(ب)

$$R_f = [-v, -1]$$

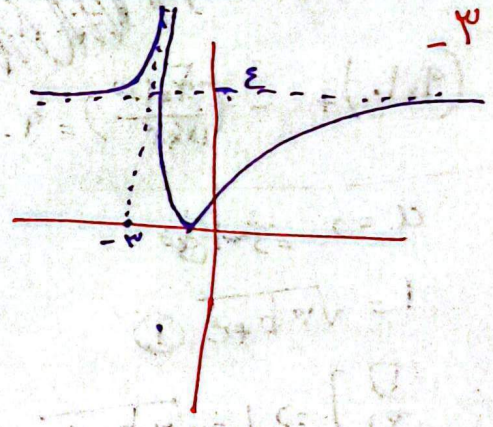
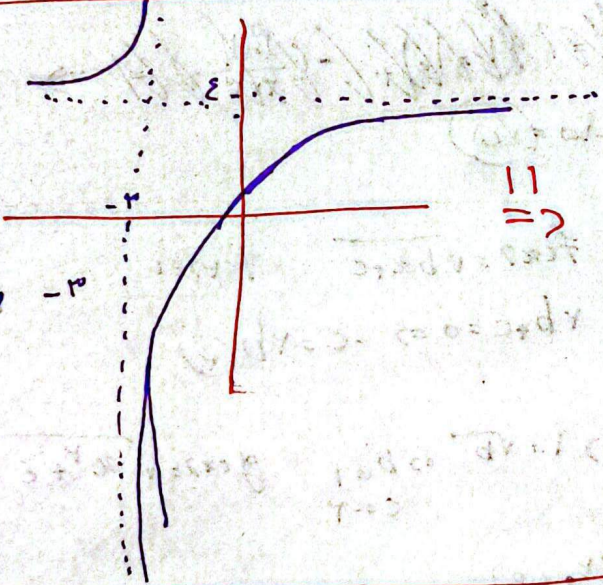
$$[x] - 1 \quad 0 \quad 1 + [x]$$



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$$y = \frac{\varepsilon x + 1}{x + 2}$$

$$\frac{\varepsilon}{1} = \varepsilon, -v$$

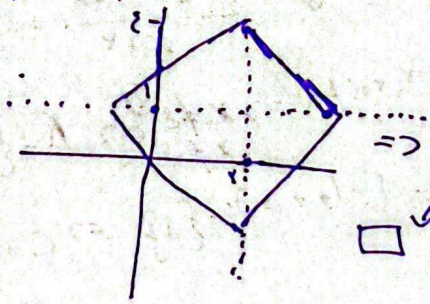
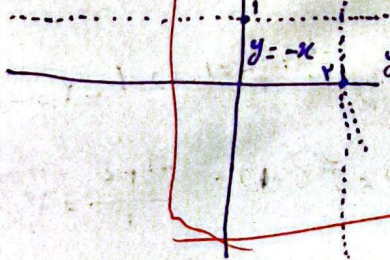


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$$x \quad y \quad |y-1| = x+1 \quad |y-1| = \omega - x$$

$$\begin{matrix} y = x+2 & y = 4-x \\ y = -x & y = x-\varepsilon \end{matrix}$$

$$y = |x-1| - 2 \quad y = \varepsilon - |x-1|$$



الف

$$x + \frac{1}{x} \geq 2 \checkmark \Rightarrow x + \frac{1}{x} + 2\sqrt{x \cdot \frac{1}{x}} \Rightarrow \min \Rightarrow$$

$$x + \frac{1}{x} \leq 2 \Rightarrow \text{خاطئ}$$

$$R_f = [2 + 2\sqrt{2}, +\infty)$$

ب

$$y = -\sin^2 x + 2 \sin x + 3$$

$$\left. \begin{array}{l} \min = -1 \Rightarrow -1 - 2 + 3 = 0 \\ \max = 1 \Rightarrow 1 - 1 + 2 + 3 = 5 \\ -\frac{b}{2a} = \frac{-2}{-2} = 1 \Rightarrow -1 + 2 + 3 = 5 \end{array} \right\} \Rightarrow R_f = [0, 5]$$

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$$\begin{aligned} & \left(-\frac{1}{3} + 1\right) + \left(-\frac{2}{3} + 1\right) + (-1 + 1) + \left(-\frac{4}{3} + 1\right) + \left(-\frac{9}{3} + 1\right) + \left(-\frac{16}{3} + 1\right) + \left(-\frac{25}{3} + 1\right) + \\ & \left(-\frac{36}{3} + 1\right) + \left(-\frac{49}{3} + 1\right) + \left(-\frac{64}{3} + 1\right) + \left(-\frac{81}{3} + 1\right) + \left(-\frac{100}{3} + 1\right) = \\ & (9 + 1) - \left(\frac{5 \times 100}{1 \times 3}\right) = 9 - 100 = -91 \end{aligned}$$

د

$$a = 0 \Rightarrow \text{خطی}$$

$$f(x) = \sqrt{bx+c} \quad f(0) = 1$$

$$1 = \sqrt{3b+c} \quad (1)$$

$$3b+c=0 \Rightarrow -c=3b \quad (2)$$

$$\left. \begin{array}{l} (1) \\ (2) \end{array} \right\} \Rightarrow 1 = \sqrt{3b-3b} \Rightarrow 1 = \sqrt{0} \Rightarrow b=1 \quad g(x) = \sqrt{x^2+5} \Rightarrow c=-2$$

$$\min = \sqrt{5} = 2 \Rightarrow R_f = [2, +\infty)$$

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$$x \neq -2 \quad \frac{x(x^2-5)}{x+2} = \frac{x(x-2)(x+2)}{(x+2)} = x^2-2x$$

$$x^2-2x \neq 0 \Rightarrow x \neq 0 \Rightarrow R = \{-2, 5\} \Rightarrow \left. \begin{array}{l} a = -2 \\ b = 5 \end{array} \right\} \Rightarrow -\frac{b}{2a} = \frac{5}{4} = 1 \Rightarrow 1 - 2 = -1$$

$$R_f = [-1, +\infty) - \{1\} \Rightarrow c = -1 \quad f\left(\frac{5-2}{-2}\right) = f(-1) = \frac{-1+5}{1} = 4$$

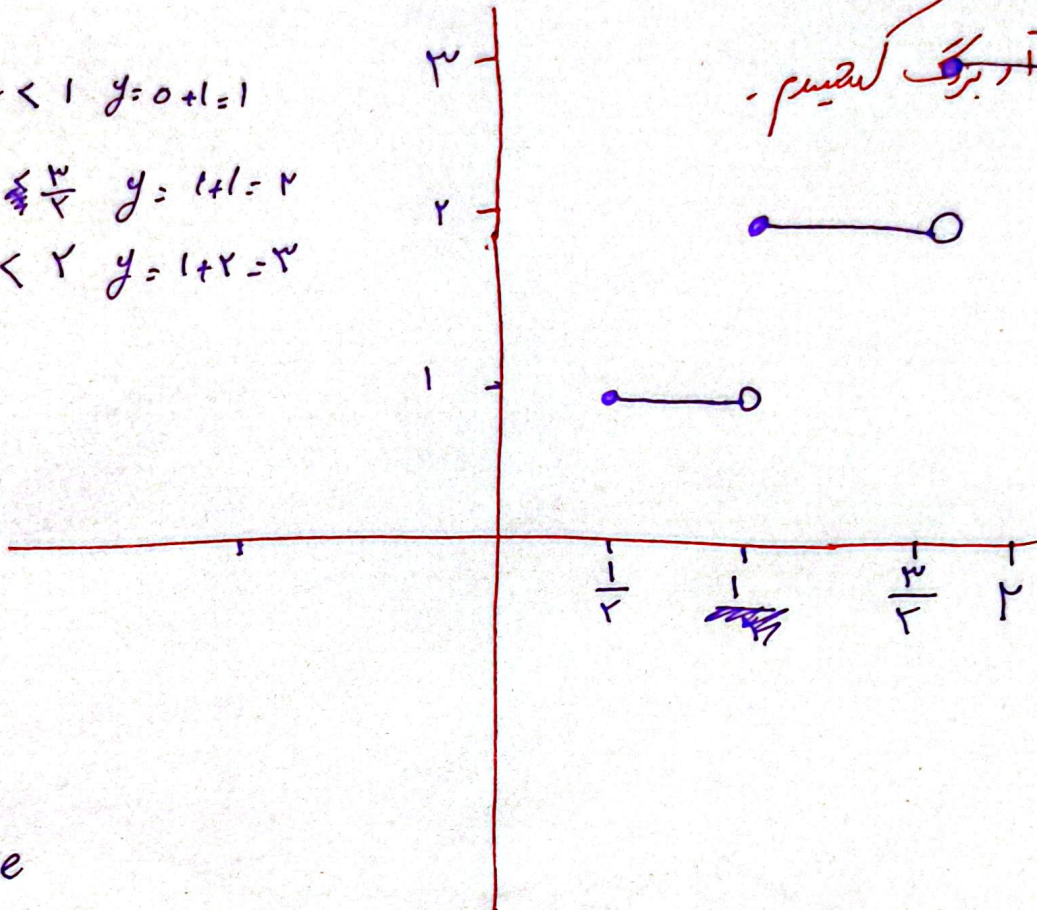
$$x^3 + ax^2 + bx - 1 = (x + \alpha)^3 \Rightarrow \begin{matrix} a^3 = -1 \\ a = -1 \end{matrix} \quad b = (-1)^3 \times 3 = -3$$

$$a = 3 \times 1 - 2 = -1 \Rightarrow$$

$$y = \sqrt[3]{(x-1)^3} = x-1$$

$$R_f = [f(-1), f(1)] = [-1, 1]$$

$$\begin{aligned} \frac{1}{3} \leq x < 1 & y = 0+1=1 \\ 1 \leq x \leq \frac{2}{3} & y = 1+1=2 \\ \frac{2}{3} < x < 1 & y = 1+2=3 \end{aligned}$$



Reze

