

$$f(x+1) + f(x+2) = 3x + f(3) \quad x=1, \quad 2f(2) = 3 + f(3) \rightarrow f(3) = 3$$

$$f(x) = ax + b \rightarrow 3a + b = 3 \quad x=0, \quad f(1) + f(2) = f(3)$$

$$a + b + 2a + b = 3 \rightarrow 3a + 2b = 3 \Rightarrow b = 0, \quad a = 1$$

$$f(x) = x, \quad y = \sqrt{f(x) - x^2} \rightarrow \sqrt{3x - x^2} \rightarrow 3x - x^2 \rightarrow y_s = \frac{9}{4}$$

$$R_f = [0, \frac{9}{4}]$$

$$3x - x^2 \leq \frac{9}{4}, \quad 3x - x^2 \geq 0$$

$$f(x) = \frac{x(x^2 - 4)}{x+2} = \frac{x(x+2)(x-2)}{x+2} = x(x-2), \quad x \neq -2$$

$$x^2 - 2x \xrightarrow{x=-2} x^2 - 2x = +1, \quad y_s = -1 \rightarrow R_f = [-1, +\infty) - \{1\}$$

$$C = -1, \quad a = b = -2, \quad x_s = 1, \quad D_f = R - \{-2\}$$

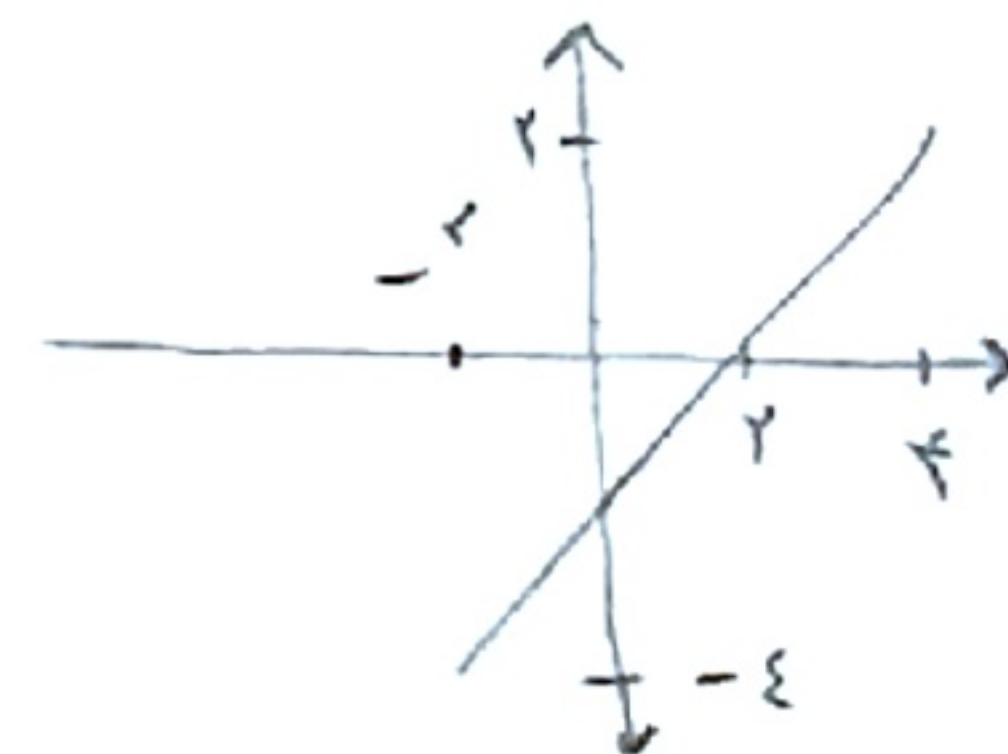
$$f\left(\frac{a+b}{rc}\right) = f\left(\frac{-2-2}{2 \times (-1)}\right) = f(2) = (2)^2 - 2(2) = 0$$

$$y = \sqrt[3]{x^3 + ax^2 + bx - 1} \xrightarrow{\text{تبعی است}} y = \sqrt[3]{(x-2)^3} = x-2$$

$$(x-2)^3 = x^3 - 2x^2 + 4x - 8 \rightarrow a = -2, \quad b = 4$$

$$D_f = [-2, 4], \quad f(-2) = -4$$

$$R_f = [-4, 2], \quad f(4) = 2$$



$$D_{y_1} = [-1, +1)$$

$$R_{y_2} = [-1, +1)$$

$$a + b = 1 + 1 = 2$$

$$\frac{x+1}{1-x} \geq 0 \rightarrow \frac{-1}{-1 + \frac{1}{0}} \rightarrow D_{y_1} = [-1, +1)$$

$$\frac{ax^2 - 1}{x^2 + b} \xrightarrow{\text{مخرج و صورت}} \frac{a \frac{1}{x^2} + b}{c \frac{1}{x^2} + d} \rightarrow x^{\max} = +\infty \rightarrow y = a$$

$$x^{\min} = 0 \rightarrow y = -\frac{1}{b}$$

$$R_{y_2} = [-\frac{1}{b}, a)$$

$$-\frac{1}{b} = -1 \rightarrow b = 1$$

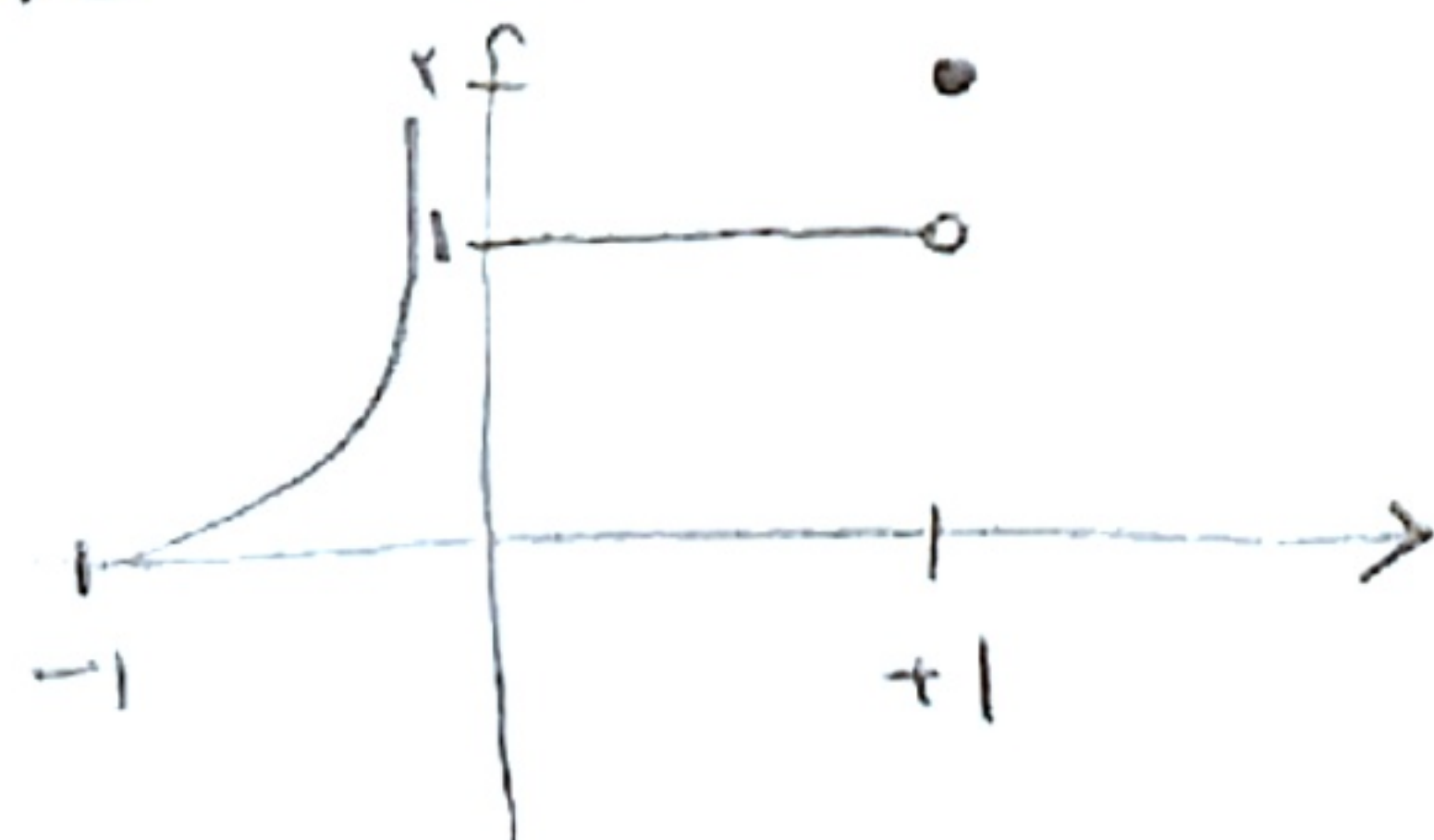
$$a = 1$$

$$f(x) = \frac{[x]}{x} + \frac{|x|}{x}$$

$$D_f = [-1, +1] - \{0\} \rightarrow -1 \leq x < 0 \rightarrow [x] = -1 \rightarrow -\frac{1}{x} - 1$$

$$0 < x < 1 \rightarrow [x] = 0 \rightarrow 0 + 1$$

$$x = 1 \rightarrow [x] = 1 \rightarrow \frac{1}{x} + 1$$

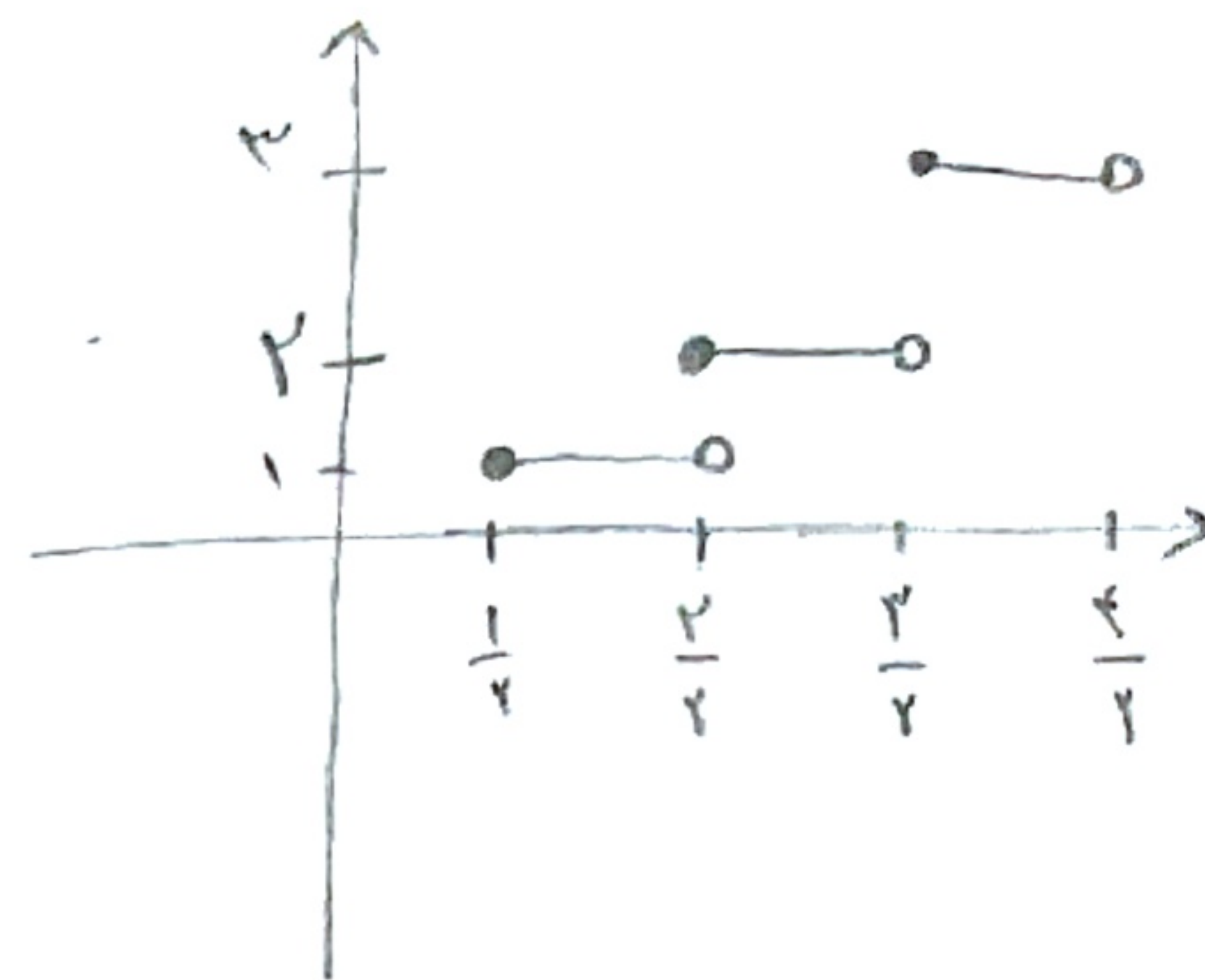


$$y = [x] + \left[x + \frac{1}{r}\right]$$

$$\frac{1}{r} \leq x < 1 \rightarrow [x] = 0, \left[x + \frac{1}{r}\right] = 1$$

$$1 \leq x < \frac{r}{2} \rightarrow [x] = 1, \left[x + \frac{1}{r}\right] = 1$$

$$\frac{r}{2} \leq x < r \rightarrow [x] = 1, \left[x + \frac{1}{r}\right] = r$$



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$$\left| \frac{x+1}{ax+3} \right| < 1 \rightarrow |x+1| < |ax+3|, (x+1)^2 < (ax+3)^2$$

$$(x+1)^2 - (ax+3)^2 < 0 \rightarrow (x+1+ax+3)(x+1-ax-3) < 0$$

$$((a+1)x+4)((1-a)x-2) < 0 \rightarrow \text{این خط است پس میانه را میابیم}$$

$$a = -1 \rightarrow 4(2x-2) < 0 \rightarrow x-1 < 0 \rightarrow x < 1$$

$$a = 1 \rightarrow -2(2x+4) < 0 \rightarrow x+2 > 0 \rightarrow x > -2$$

اگر $a=1$ $\frac{x+1}{x+3}$
 $a=1 \rightarrow a-b=2$
 $b=-2$
 این میانه را میابیم

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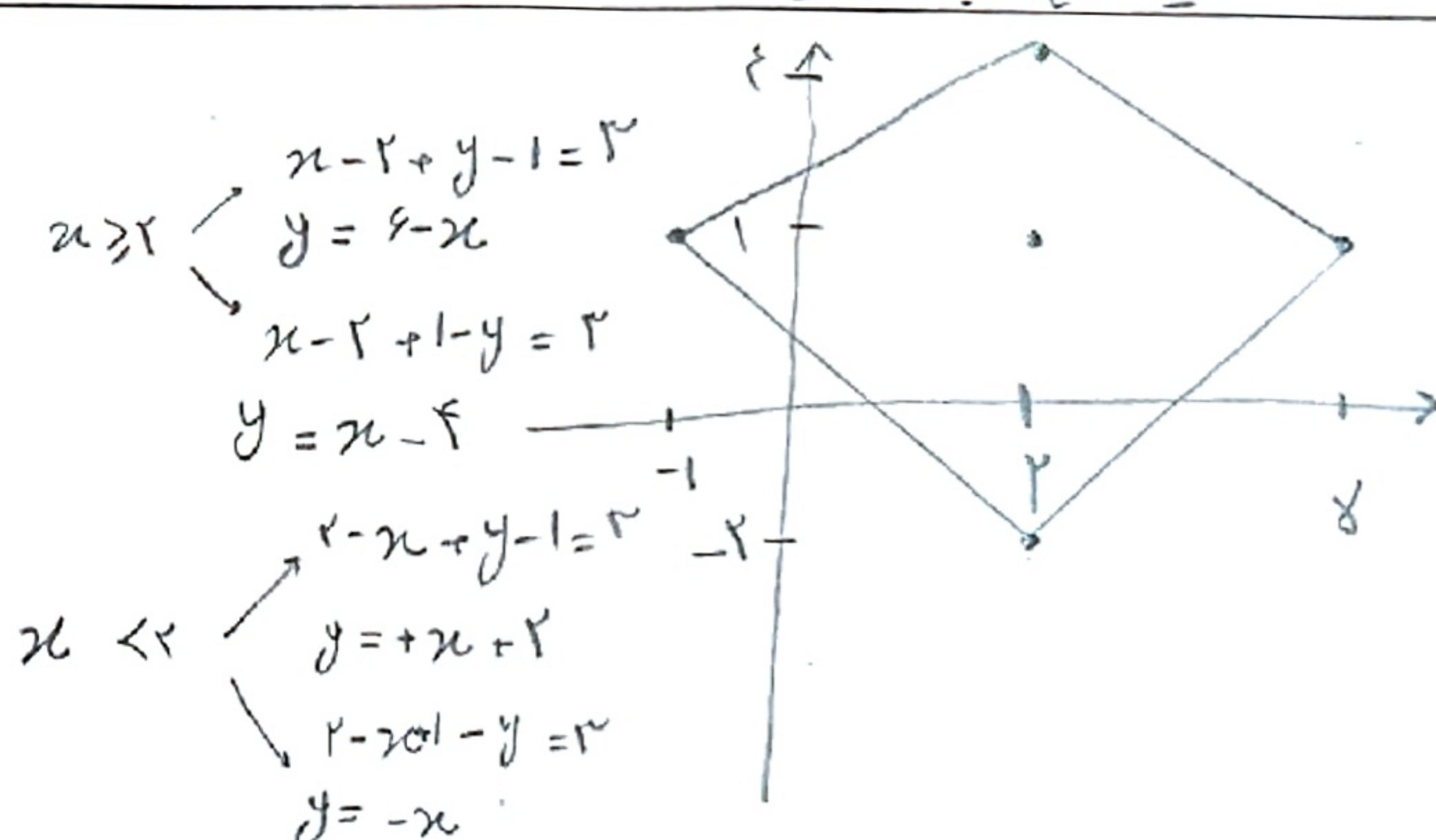
$$|x-2| + |y-1| = 3$$

$$x \geq 2 \rightarrow |x-2| = x-2$$

$$x < 2 \rightarrow |x-2| = 2-x$$

$$y \geq 1 \rightarrow |y-1| = y-1$$

$$y < 1 \rightarrow |y-1| = 1-y$$



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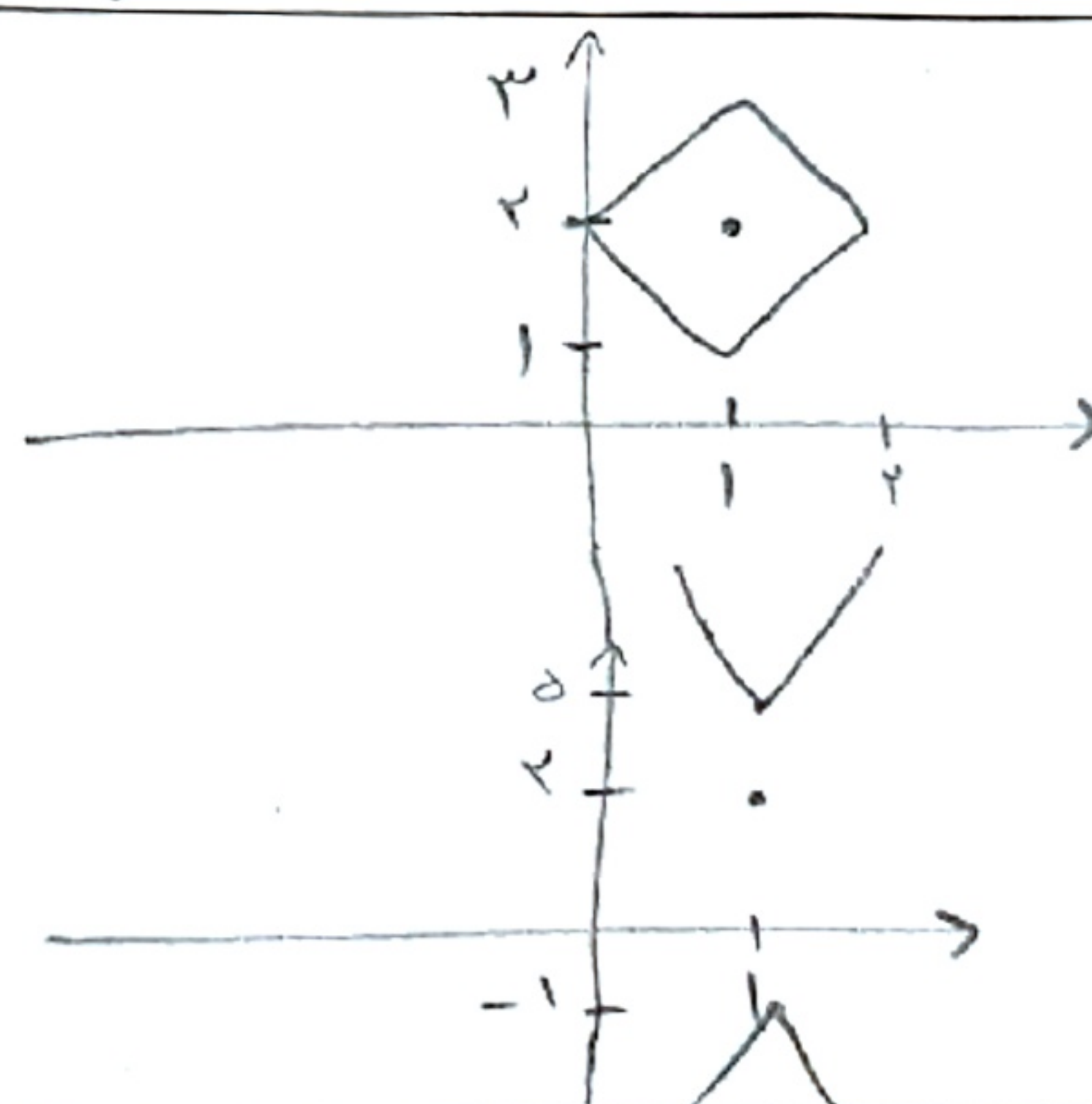
$$a) |x-1| + |y-2| = 1$$

$$\downarrow \quad \downarrow$$

$$x=1 \quad y=2$$

$$b) |x-1| - |y-2| = -3$$

$$= |y-2| - |x-1| = 3$$



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$$y = rx + |ax+b|$$

این دو خط همواره موازی است

$$y \begin{cases} (r+a)x + b \\ (r-a)x - b \end{cases}$$

$$ax+b \geq 0$$

$$x \geq -\frac{b}{a}$$

$$ax+b < 0$$

$$x < -\frac{b}{a}$$

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$$r+a > 0 \rightarrow a > -r$$

$$r-a > 0 \rightarrow r > a$$

$$r+a < 0 \rightarrow a < -r$$

$$r-a < 0 \rightarrow r < a$$

$$|a| < r, -r < a < r$$