

۱, ۲, ۳

$$F(2x+1) + F(x+2) = 3x + F(3) \quad \text{ترتیب خطی} = ax+b \quad \text{برد } y = \sqrt{F(x)-x^2}$$

$$a(2x+1) + b + a(x+2) + b = 3x + 3a + b$$

$$\frac{a(2x+3) + 2b = 3x + 3a + b \rightarrow \begin{cases} 2a = 3 \\ a = 1.5 \\ b = 2 \end{cases} \quad F(x) = x$$

$$y = \sqrt{x-x^2} \rightarrow -x^2 + x \quad \sqrt{\frac{1}{4}} = \frac{1}{2} \quad \text{رادیکال} \quad \frac{1}{2} \rightarrow y_{\max} = \frac{1}{2} \rightarrow [0, \frac{1}{2}] = R_y$$

$$F(x) = \frac{x^3 - 2x}{x+2} \quad D_f = \mathbb{R} - \{a, b\} \quad R_y = [c, +\infty) - \{N\} \quad F\left(\frac{a+b}{2}\right) = ?$$

$$D_f = \mathbb{R} - \{a, b\} \rightarrow \begin{cases} a = -2 \\ b = 2 \end{cases} \quad F(x) = \frac{x(x-2)(x+2)}{x+2} = \frac{x^2-2x}{x+2}$$

$$x^2 - 2x = 14x + 14 \quad 14 \rightarrow x = 2 \quad F\left(\frac{-2+2}{-1}\right) = F(-1) = \frac{-1-1}{-1} = 2$$

$$y = \sqrt[3]{x^3 + ax^2 + bx - 1} \quad D_y = [a, b] \quad (x-b)^3 = x^3 + 3b^2x - 3bx^2 - 1 \rightarrow D_y = [-4, 12]$$

$$y = x - 2 \quad -4 \leq x \leq 12 \rightarrow -8 \leq x-2 \leq 10 \rightarrow R_y = [-8, 10]$$

$$y_1 = \left(\frac{x+1}{1-x}\right)^{\frac{1}{2}} \quad y_2 = \frac{ax^2-1}{x^2+b} \quad D_{y_1} = R_{y_2} \quad 1+1=2 \quad \text{بیشترین} \rightarrow 1=a$$

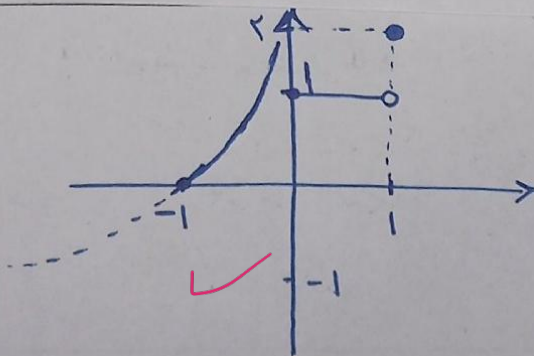
$$D_{y_1} = \text{محدوده تعریف نمی تواند} \quad [-1, 1) = R_{y_2} \quad y_2 = \frac{ax^2-1}{x^2+b} \quad \text{کمترین} \rightarrow -\frac{1}{b} = 1 \rightarrow b = -1$$

$$y = \frac{[x]}{x} + \frac{|x|}{x} \quad [-1, 1]$$

$$-1 \leq x < 0 \rightarrow \frac{-1}{x} - 1$$

$$0 \leq x < 1 \rightarrow 0 + 1 = 1$$

$$x=1 \rightarrow 1 + 1 = 2$$

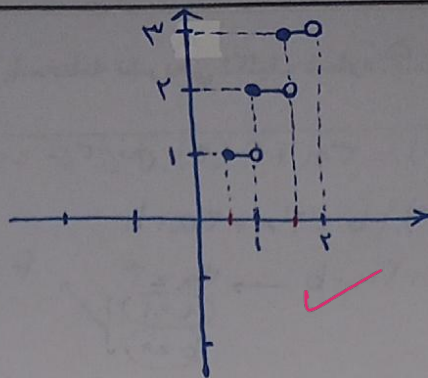


$$y = [x] + [x + \frac{1}{2}] \quad [\frac{1}{2}, 2)$$

$$\frac{1}{2} \leq x < 1 \rightarrow 0+1$$

$$1 \leq x < \frac{3}{2} \rightarrow 1+1$$

$$\frac{3}{2} \leq x < 2 \rightarrow 1+2$$



۳ یا ۰.۵

۶

۲

$$\left| \frac{x+1}{ax+3} \right| < 1 \quad D = (b, +\infty)$$

$$|x+1| < |ax+3| \rightarrow x^2 + 2x + 1 < a^2x^2 + 6ax + 9 \rightarrow (a^2-1)x^2 + (6a-2)x + 8 > 0$$

$$a^2-1=0 \rightarrow a=\pm 1 \quad D=(b, +\infty)$$

$$a=1 \leftarrow a > \frac{1}{2} \leftarrow 6a-2 > 0 \leftarrow 0 < x \leftarrow \text{منطقه اول}$$

$$\xrightarrow{\text{در نهایت}} 8x+8 > 0 \rightarrow x > -2 \rightarrow \boxed{b=-2} \quad a-b \rightarrow 1+2 \geq 3$$

۷

۲

$$|x-2| + |y-1| \geq 3$$

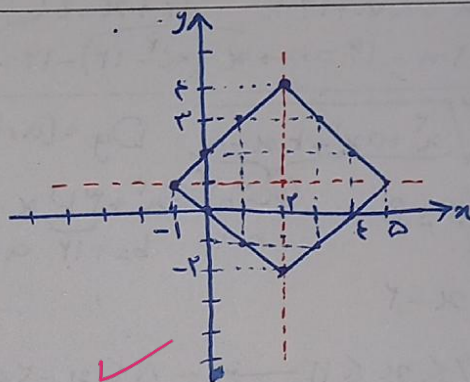
$$x_1=2 \quad y_1=1$$

$$① x \geq 2, y \geq 1 \rightarrow y = -x + 4$$

$$② x \geq 2, y \leq 1 \rightarrow y = x - 3$$

$$③ x \leq 2, y \geq 1 \rightarrow y = x + 2$$

$$④ x \leq 2, y \leq 1 \rightarrow y = -x$$



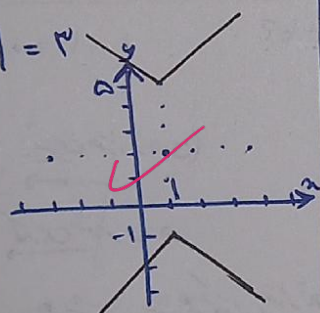
۸

۲

$$|x-1| - |y-2| = -3 \quad \text{(ب) نمودار زیر تر کردیم کمتر}$$

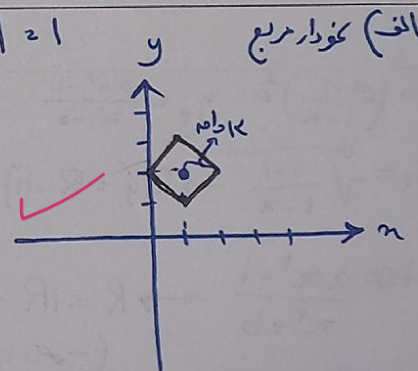
$$x(-1) \rightarrow |y-2| - |x-1| = 3$$

$$A \begin{vmatrix} 1 \\ 2 \end{vmatrix}$$



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

$$A \begin{vmatrix} 1 \\ 2 \end{vmatrix}$$



۹

۲

$$y = 3x + |ax+b| \quad R_y = \mathbb{R}$$

$$y = \begin{cases} (3+a)x + b & ax+b > 0 \\ (3-a)x - b & ax+b \leq 0 \end{cases}$$

$$(3+a)(3-a) < 0 \rightarrow 9 - a^2 < 0 \rightarrow a^2 > 9$$

$$a < -3 \text{ یا } a > 3$$

$$a \in (-\infty, -3) \cup (3, +\infty)$$

$$a^2 < 9 \rightarrow -3 < a < 3 \rightarrow |a| < 3$$

۱۰

۱۰