

$$y = \left(x - 2\left[\frac{x}{2}\right]\right)^2 \rightarrow \left(2\frac{x}{2} - 2\left[\frac{x}{2}\right]\right)^2 \xrightarrow{\frac{x}{2}=t} \left(2t - 2[t]\right)^2$$

$$R = [0, 2)^2$$

$$\Rightarrow R_y = [0, 2)$$

$$\text{ب) } \text{Cev } y = 1 + \sin x \Rightarrow y = 1 + \sin x \xrightarrow{[-1, 1]} R_y = [1, 2]$$

$$f(x) = \sqrt{\frac{x^2 - 4}{x^2 - 1}} \rightarrow R = \left[0, \frac{2}{3}\right] \cup (1, +\infty) = \left[0, \frac{2}{3}\right] \cup (1, +\infty)$$

$$\Rightarrow a = 0, b = \frac{2}{3}, c = 1 \rightarrow a + b + c = \frac{5}{3}$$

$$f(x) = 2x + \frac{1}{x} + 2\sqrt{x+1} \Rightarrow R_f = [2 + 2\sqrt{2}, +\infty)$$

برای $x=1$ min
وجود ندارد.

$$\text{ب) } f(x) = (3 - \sin x)(1 + \sin x) = y = -\sin^2 x + 3\sin x + 3$$

$$\begin{matrix} \sin x = 1 & 3 \\ \sin x = -1 & 0 \\ \sin x = -\frac{3}{2} & \frac{15}{4} \end{matrix} \Rightarrow R = \left[0, \frac{15}{4}\right]$$

$$f(x) = -\frac{1}{x}x + 10, D_f = \{x \mid x \in \mathbb{N}, 1 \leq x \leq 9\}$$

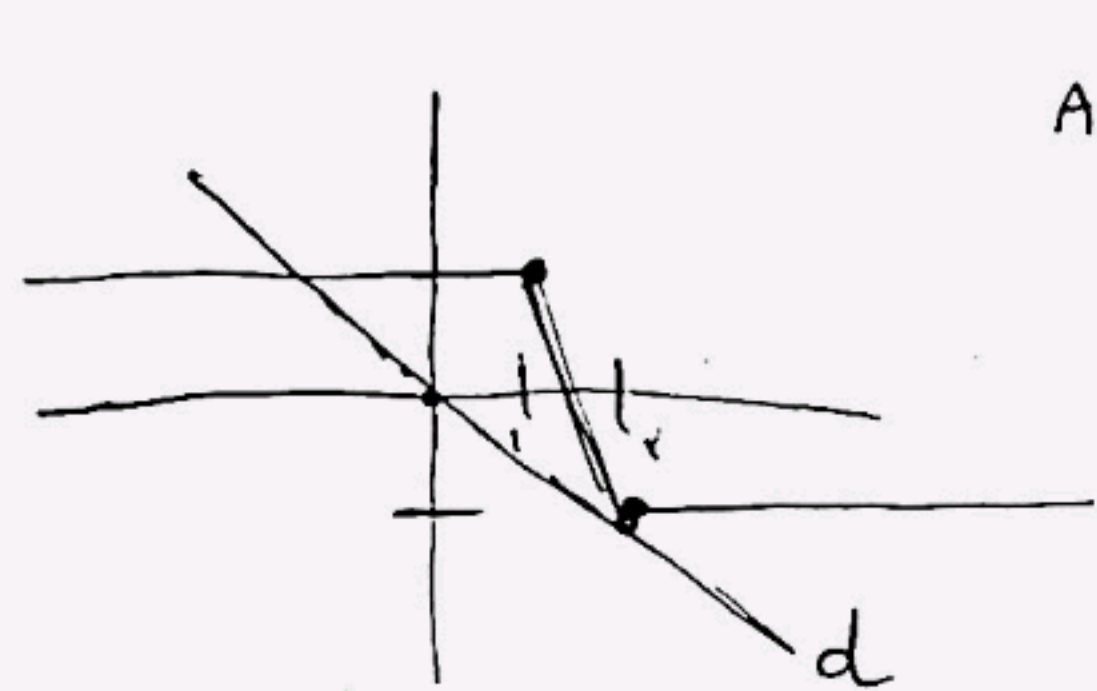
$$f(x) = \left\{ \left(1, \frac{9}{1}\right), \left(2, \frac{11}{2}\right), \left(3, 9\right), \left(4, \frac{13}{4}\right), \left(5, \frac{15}{5}\right), \left(6, 11\right), \right.$$

$$\left. \left(7, \frac{13}{7}\right), \left(8, \frac{11}{8}\right), \left(9, 1\right) \right\} \rightarrow \text{مجموع المانها} = \frac{125}{3} = \sqrt{5}$$

$$f(x) : \Rightarrow a = 0 \quad \begin{cases} x=2 \rightarrow 2b+c=0 \\ x=3 \rightarrow 3b+c=1 \end{cases} \Rightarrow b=1, c=-2$$

$$g(x) = \sqrt{bx^2 + ax + c} = \sqrt{x^2 + 1} \rightarrow R_g = [1, +\infty)$$

$$|x-r| - |x-1| = kx$$

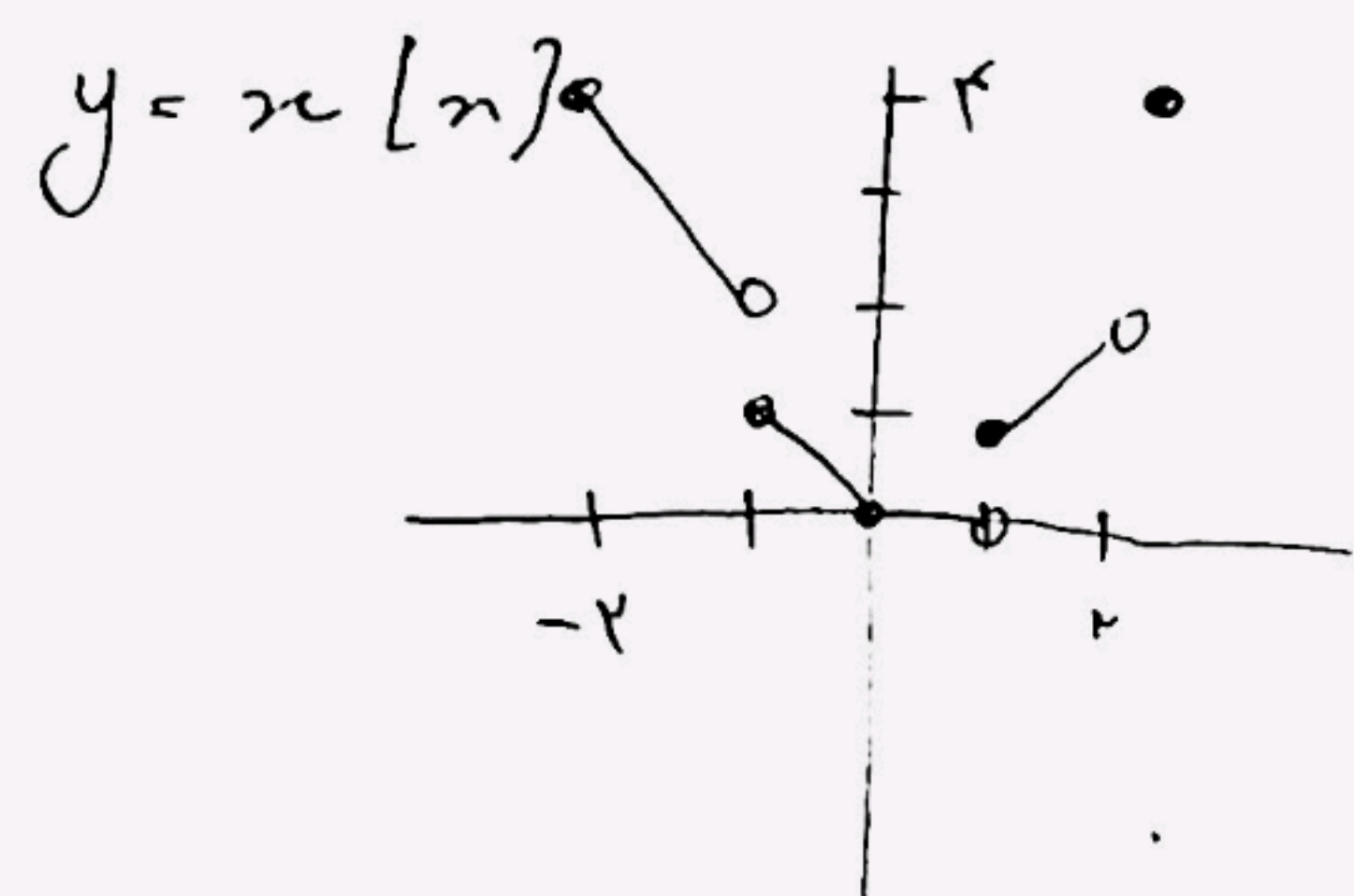


$$A \begin{vmatrix} 0 \\ 0 \end{vmatrix}$$

$$a = \frac{1}{-r}$$

$$B \begin{vmatrix} r \\ -1 \end{vmatrix} d \Rightarrow \boxed{k = -\frac{1}{r}}$$

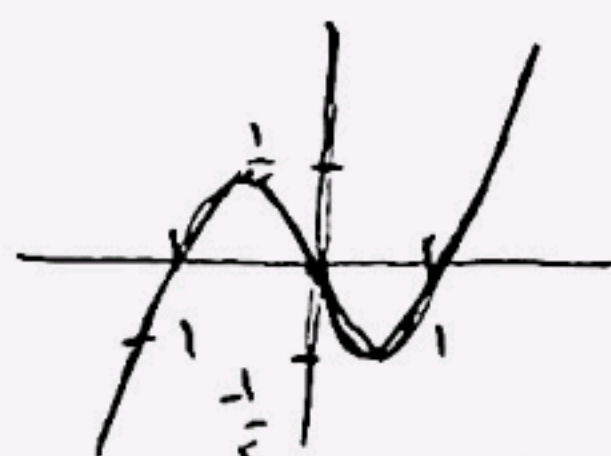
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$$y = x|x| - x$$

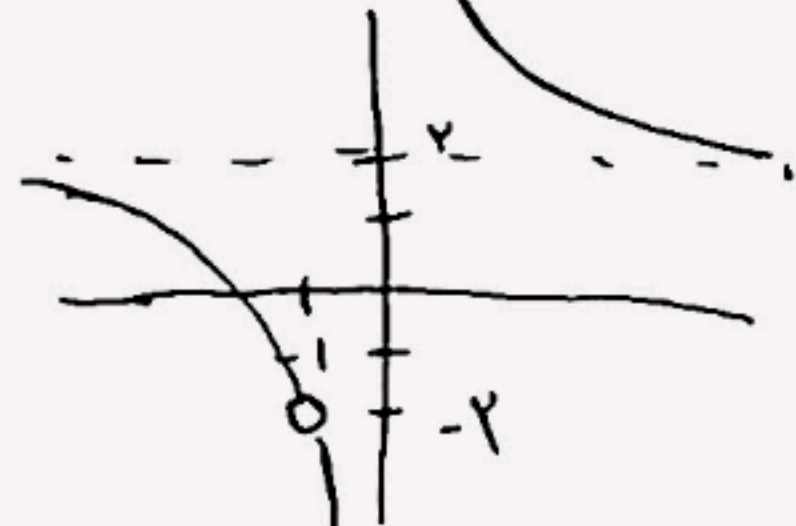
$$x > 0 \rightarrow x^2 - x$$

$$x < 0 \rightarrow x^2 - x$$



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$$y = \frac{1}{x} + \frac{1}{x+1} + \frac{1}{x^2+x} \rightarrow y = \frac{r(x+1)}{x^2+x} = \frac{r(x+1)}{x(x+1)} = \frac{r}{x}$$



$$\Rightarrow R = \mathbb{R} - \left\{ \begin{matrix} -r, r \\ \downarrow \downarrow \\ a, b \end{matrix} \right\}$$

$$\boxed{a+b=0}$$

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$$f(x) = \frac{x - \varepsilon \sqrt{x^2 + r}}{x - r \sqrt{x^2 + 1}} \approx \frac{(\sqrt{x} - r)(\sqrt{x} - 1)}{(\sqrt{x^2} - 1)(\sqrt{x^2} - 1)} \xrightarrow{x \neq 1} \frac{\sqrt{x^2} - r}{\sqrt{x^2} - 1} = f(x)$$

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$$R = (-\infty, 1) \cup [r, +\infty)$$

$$f(x) = \frac{x^r + r x^r - x - r}{x^r - 1} = \frac{(x-r)(x+1)(x+r)}{(x-1)(x+1)} = x+r$$

$$x \neq 1 \rightarrow y \neq r$$

$$x = -1 \rightarrow y \neq 1$$

$$\Rightarrow R = \mathbb{R} - \{br\}$$

$$\boxed{\begin{matrix} -\frac{1}{x} = 4r \\ \text{وال } x = r \end{matrix}}$$

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