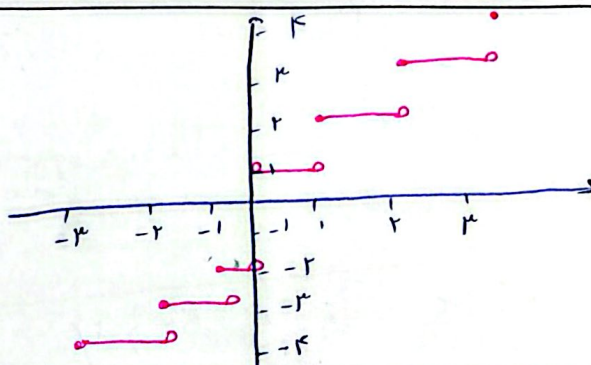


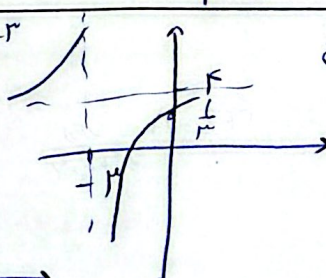
ان) $f(x) = 2\sin^2(x + \frac{\pi}{4}) - 1 \rightarrow -1 \leq \sin x \leq 1 \rightarrow 0 \leq \sin^2 x \leq 1$
 $\rightarrow 0 \leq 2\sin^2 x \leq 2 \rightarrow -1 \leq 2\sin^2 x - 1 \leq 1 \rightarrow R_f = [-1, 1]$

ب) $g(x) = 3\cos^2 x - 4 \rightarrow -1 \leq \cos x \leq 1 \rightarrow -1 \leq \cos^2 x \leq 1 \rightarrow$
 $-3 \leq 3\cos^2 x \leq 3 \rightarrow -7 \leq 3\cos^2 x - 4 \leq -1 \quad R_g = [-7, -1]$

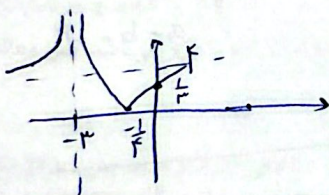
$$\begin{aligned} -3 \leq x < -2 & \quad [x] = -3 \rightarrow y = -1 - 3 = -4 \\ -2 \leq x < -1 & \quad [x] = -2 \rightarrow y = -1 - 2 = -3 \\ -1 \leq x < 0 & \quad [x] = -1 \rightarrow y = -1 - 1 = -2 \\ 0 \leq x < 1 & \quad [x] = 0 \rightarrow y = 1 + 0 = 1 \\ 1 \leq x < 2 & \quad [x] = 1 \rightarrow y = 1 + 1 = 2 \\ 2 \leq x < 3 & \quad [x] = 2 \rightarrow y = 1 + 2 = 3 \\ x = 3 & \rightarrow y = 3 \end{aligned}$$



$$g = \left| \frac{x+1}{x+3} \right| \begin{cases} \text{جانب مایم: } x+3=0 \rightarrow x=-3 \\ \text{جانب راست: } = \frac{x}{x} = 1 \end{cases}$$



$$\rightarrow y = \left| \frac{x+1}{x+r} \right|$$



$$\begin{cases} x = 2 \\ y = 1 \end{cases}$$

$$\begin{aligned} -x + y &= x + 1 \\ -2x &= 1 \\ x &= -\frac{1}{2}, y = \frac{1}{2} \end{aligned}$$

$$x + y = -2x$$

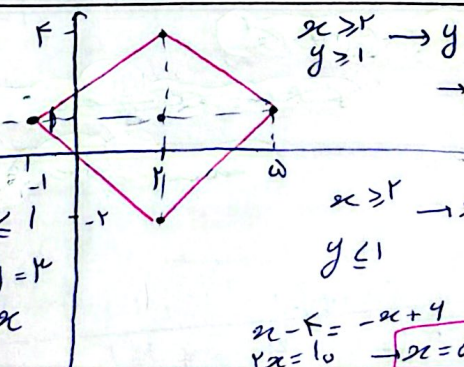
$$x = -y$$

$$x+y = -x$$
$$y = -y$$

$$a = -1, b = 1$$

$$y - x + y - 1 = k \quad \begin{matrix} y \geq 1 \\ x \leq 1 \end{matrix}$$

$$\begin{aligned} x \leq 1, y \leq 1 \\ x + y = 1 \\ y = -x \end{aligned}$$



$$\begin{aligned} x &\geq 1 \rightarrow y - 1 + x - 1 = 1 \\ y &\geq 1 \rightarrow y = -x + 1 \end{aligned}$$

$$\begin{aligned} x &\geq r \rightarrow x - r + 1 - y = r \\ y &\leq 1 \quad y = x - r \end{aligned}$$

$$x - K = -x + 4$$

$$x = 10 \rightarrow x = 2 \quad y = 1$$

الف) $f(x) = x + \frac{1}{x} + 2\sqrt{x + \frac{1}{x}}$

$$n + \frac{1}{n} > 0 \rightarrow \frac{n^2 + 1}{n} > 0 \rightarrow \infty$$

$$t = x + \frac{L}{v} \rightarrow f = t + \sqrt{t}$$

$$\rightarrow \min f = \begin{cases} \min (x + \frac{1}{x}) \xrightarrow{x=1} = 2 \\ \rightarrow \min f = 2 + 2\sqrt{2} \end{cases} \rightarrow R_f = [2 + 2\sqrt{2}, +\infty)$$

$$y = r + r \sin x - \sin x - \sin^2 x = -\sin^2 x + r \sin x + r \rightarrow \begin{cases} \sin x = 1 \rightarrow y = r \\ \sin x = -1 \rightarrow y = 0 \\ \sin \left(-\frac{b}{ra} \right) r \end{cases}$$

$$f(x) = -\frac{1}{3}x + 1 \rightarrow \begin{cases} x=1 \rightarrow y = \frac{2}{3} \\ x=2 \rightarrow y = \frac{1}{3} \\ \vdots \\ x=9 \rightarrow y = 0 \end{cases}$$

$$\frac{2 \cdot 9 + 2 \cdot 8 + \dots + 2 \cdot 1}{3} = \frac{2 \cdot 45}{3} = 30$$

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تقریباً $\rightarrow$ معادله $\rightarrow a=0$ $f(1)=0 \rightarrow \sqrt{2b+c}=0 \rightarrow 2b+c=0$

$$f(1)=1 \rightarrow \sqrt{2b+c}=1 \rightarrow 2b+c=1$$

$$\begin{cases} 2b+c=1 \\ 2b+c=0 \end{cases} \rightarrow \begin{matrix} b=1 \\ c=-2 \end{matrix}$$

$$g(x) = \sqrt{x^2+2} \rightarrow \min g(x) = 2$$

$$R_g = [2, +\infty)$$

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$$f(x) = \frac{x^2 - 4x}{x+2} \Rightarrow D_f = \mathbb{R} - \{-2\}$$

$$f(x) = \frac{x(x-4)}{x+2} = \frac{x(x+2)(x-2)}{x+2} = x(x-2)$$

$$f(x) = x^2 - 2x$$

$$f(-2) = 4 + 4 = 8$$

$$c=-1, a=b=-2$$

$$f\left(\frac{-c}{a}\right) = f(2) = \frac{4-4}{2} = 0$$

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معادله را حل کنید $\rightarrow x^2 + ax + b = (x-2)^2 = x^2 - 4x + 4$

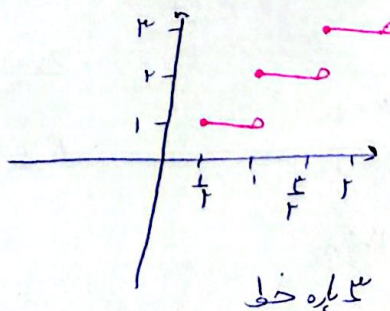
$$\rightarrow a=-4, b=4 \quad \text{رابطه} = [-4, 4] \quad y = x-2 \quad \frac{y}{x} = \left[-\frac{1}{2}, \frac{1}{2}\right]$$

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$$\left\lfloor x + \frac{1}{2} \right\rfloor = 1 \rightarrow \frac{1}{2} \leq x < 1 \rightarrow \lfloor x \rfloor = 0 \rightarrow y = 0 + 1 = 1$$

$$1 \leq x < \frac{3}{2} \rightarrow \lfloor x \rfloor = 1 \rightarrow y = 1 + 1 = 2$$

$$\frac{3}{2} \leq x < 2 \rightarrow \lfloor x \rfloor = 1 \rightarrow y = 1 + 2 = 3$$



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