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$$g(x) = \cos^3 x - 4$$

$[-\pi, \pi]$

$$\Rightarrow R_f = [-5, -1]$$

$$f(x) = 2 \sin\left(x + \frac{\pi}{4}\right) - 1$$

$[0, 2]$

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

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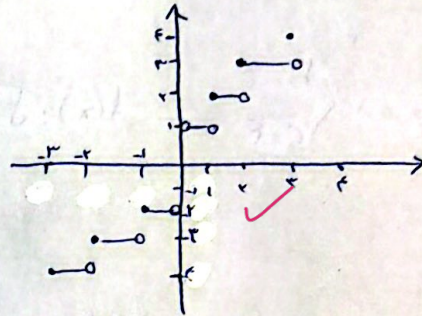
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$$y = \frac{x}{|x|} + [x]$$

$x \in \mathbb{R} \rightarrow -1 + [x]$
 $x \in \mathbb{R} \rightarrow 1 + [x]$

$$\begin{aligned} -1 < x < 1 &\rightarrow y = -1 \\ -1 < x < 1 &\rightarrow y = -1 \\ -1 < x < 1 &\rightarrow y = -1 \\ 1 < x < 2 &\rightarrow y = 1 \\ 1 < x < 2 &\rightarrow y = 2 \\ 2 < x < 3 &\rightarrow y = 3 \\ 3 < x < 4 &\rightarrow y = 4 \end{aligned}$$

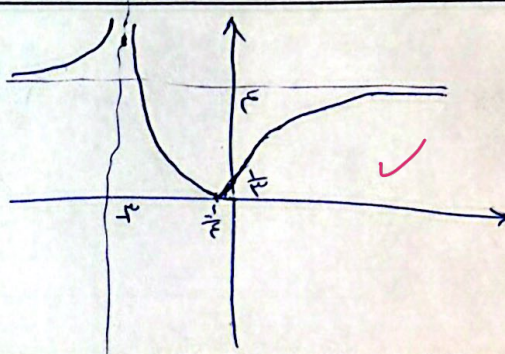


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$$y = \left| \frac{x+1}{x+3} \right|$$

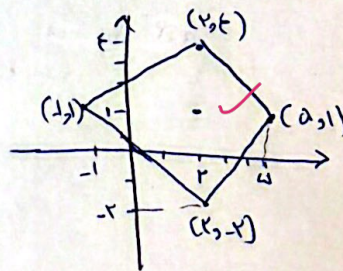
$x = -3$
 $y = 4$



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$$\begin{cases} 1-x+y=3 \rightarrow x+y=2 & x < 1, y < 1 \\ 1-x+y=3 \rightarrow y-x=2 & x < 1, y < 1 \\ 1-x+y=3 \rightarrow x+y=2 & x < 1, y < 1 \\ 1-x+y=3 \rightarrow y-x=2 & x < 1, y < 1 \end{cases}$$



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$$y = (3 - \sin x)(1 + \sin x) = -\sin^2 x + 2\sin x + 3$$

$$\sin x = \frac{-b}{a} = \frac{-2}{-1} = 2 \rightarrow y = 3$$

$$\sin x = 1 \rightarrow y = 4$$

$$\sin x = -1 \rightarrow y = 0$$

$$R_f = [0, 4]$$

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

$$x + \frac{1}{x} + 2\sqrt{x - \frac{1}{x}} + 1 - 1 = \frac{x^2 + 1}{x} + 2\sqrt{x - \frac{1}{x}} - 1$$

$$-(x+1)^2 - 1 \rightarrow R_f = [2, +\infty)$$

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$$D = \{1, 2, 3, \dots, 9\}$$

$$x=1 \rightarrow y = \frac{2 \cdot 1}{1}$$

$$x=2 \rightarrow y = \frac{2 \cdot 2}{2}$$

$$x=3 \rightarrow y = \frac{2 \cdot 3}{3}$$

$$x=4 \rightarrow y = \frac{2 \cdot 4}{4}$$

$$x=5 \rightarrow y = \frac{2 \cdot 5}{5}$$

$$x=6 \rightarrow y = \frac{2 \cdot 6}{6}$$

$$x=7 \rightarrow y = \frac{2 \cdot 7}{7}$$

$$x=8 \rightarrow y = \frac{2 \cdot 8}{8}$$

$$x=9 \rightarrow y = \frac{2 \cdot 9}{9}$$

$$\frac{2 \cdot 1 + 2 \cdot 2 + \dots + 2 \cdot 9}{9} = \frac{2 \cdot (1+2+\dots+9)}{9} = \frac{2 \cdot 45}{9} = 10$$

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

$$g(x) = \sqrt{x+5} \rightarrow R_g = [5, +\infty)$$

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$$D = \mathbb{R} \setminus \{-1\}$$

$$R = [-1, +\infty) \setminus \{1\} \quad c=1$$

$$\frac{x^3 - 4x}{x+2} = 1 \quad \begin{matrix} a=2 \\ b=-4 \end{matrix}$$

$$x^3 - 4x = 1(x+2) \rightarrow x^3 - 5x - 2 = 0 \rightarrow x = -2 \quad \checkmark \quad x = 2$$

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

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صفحه آخر...

$$\sqrt{(x-2)^2} = x-2 \quad \text{دقیقاً برقرار}$$

$$x^2 - 4x + 4 = 0 \rightarrow x = 2$$

$$D = [-9, 12] \rightarrow R = [-1, 1]$$

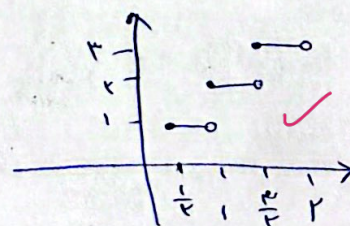
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$$\frac{1}{2} < x < 1 \rightarrow y = 1$$

$$\frac{1}{2} < x < \frac{3}{2} \rightarrow y = 2$$

$$\frac{3}{2} < x < 2 \rightarrow y = 3$$



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$$f(n) = \frac{n(n-2)(n+2)}{n+2} = n^2 - 2n$$

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$$n^2 - 2n \neq 8 \rightarrow \begin{cases} n \neq -2 \\ n \neq 4 \end{cases}$$

۸ = ۸ درجه تابع نیست یعنی :

پس دامنه پذیر است : $D_f = \mathbb{R} - \{-2, 4\}$

$$f(n) = n^2 - 2n \rightarrow \left. \text{ext} \right|_{-1}^1 \Rightarrow R_f = [-1, +\infty) - \{8\}$$

حالا بیایم سراغ برد :

$$f\left(\frac{a+b}{2}\right) = f\left(\frac{2}{-2}\right) = f(-1) \rightarrow f(-1) = 3$$