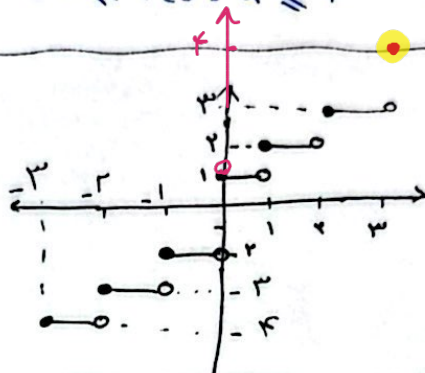


19.5
 (رنا عاقلی)
 الف) $-1 \leq \sin x \leq 1 \Rightarrow 0 \leq \sin^2 x \leq 1 \Rightarrow 2 \sin^2 x \leq 2$
 $\Rightarrow -1 \leq 2 \sin^2 x - 1 \leq 1 \quad R: [-1, 1] \checkmark$ (2) ①

ب) $-1 \leq \cos^3 x < 1 \Rightarrow -3 \leq 3 \cos^3 x \leq 3 \Rightarrow -7 \leq 3 \cos^3 x - 4 \leq 1 \checkmark$

$\begin{cases} x > 0 \rightarrow [x]_+ 1 \\ x < 0 \rightarrow [x]_- 1 \end{cases}$



خود رسم
 طبعاً!

صفر تعریف شده است

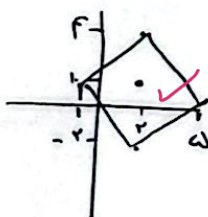
$y = \frac{f(x)}{x^3} \rightarrow$



$y = \left| \frac{f(x)}{x^3} \right| \rightarrow$



$y = x \checkmark \quad y = -x \checkmark$
 $y = -x \checkmark \quad y = x \checkmark$



الف) $t = \sqrt{x} \Rightarrow f(x) = t^2 + 2t$

$\begin{cases} t = \sqrt{2} \rightarrow y = 2 + 2\sqrt{2} \\ t = +\infty \rightarrow y = +\infty \\ \frac{-b}{2a} = \frac{-2}{2} = -1 \quad \alpha \end{cases}$

$\Rightarrow R = [2 + 2\sqrt{2}, +\infty)$

ب) $f(x) = -\sin^2 x + 2 \sin x$

$\sin x \leftarrow \begin{matrix} -1 \rightarrow -1 + 2 = 1 \\ 1 \rightarrow -1 + 3 = 2 \\ \frac{-b}{2a} \rightarrow 1 \end{matrix}$

$\Rightarrow R = [0, 2] \checkmark$

$$\left. \begin{aligned} f(1) &= -\frac{1}{3} + 1 \\ f(2) &= -\frac{2}{3} + 1 \\ &\vdots \\ f(9) &= -\frac{9}{3} + 1 \end{aligned} \right\} \rightarrow 9 \cdot 1 - \frac{9}{3} = 9 - 3 = 6 \quad (2) \quad (1)$$

$$\begin{aligned} f(x) &= 0, f(y) = 1 \\ \Rightarrow yba &= 0 \\ yba &= 1 \end{aligned} \Rightarrow b=1, c=-2 \quad (2) \quad (1)$$

$$\Rightarrow g(x) = \sqrt{x^2 + 4} \rightarrow \text{graph} \Rightarrow R = \sqrt{[4, +\infty)} = [2, +\infty)$$

$$f(x) = \frac{x(x+2)(x-2)}{x+2} = x(x-2) = x^2 - 2x, x \neq -2 \quad (2) \quad (1)$$

$$x^2 - 2x \neq 1 \Rightarrow x \neq 1 \Rightarrow D = \mathbb{R} - \{-2, 1\} \Rightarrow a = -2, b = 1$$

$$\downarrow$$

$$\text{graph} \rightarrow R = [-1, +\infty) \Rightarrow c = -1 \Rightarrow f\left(\frac{a-b}{2c}\right) = f(-1) = 3$$

$$y = \sqrt[3]{(x-2)^3} = \sqrt{x^2 - 4x + 4} \Rightarrow a = -4, b = 4$$

$$D = [-4, 4]$$

$$y = x - 2 \rightarrow \mathbb{R} \begin{cases} x=4 \rightarrow y=2 \\ x=12 \rightarrow y=10 \end{cases} \Rightarrow [-2, 10]$$

$$\begin{aligned} \frac{1}{2} \leq x < 1 &\rightarrow \{x\} = 0, \{x + \frac{1}{2}\} = 1 \\ 1 \leq x < \frac{3}{2} &\rightarrow \{x\} = 1, \{x + \frac{1}{2}\} = 1 \\ \frac{3}{2} \leq x < 2 &\rightarrow \{x\} = 1, \{x + \frac{1}{2}\} = 2 \end{aligned}$$

