

ترانه طاهریان - تکلیف ۴ - دوازدهم ریاضی

الف) $f(x) = 2 \sin^2\left(x + \frac{\pi}{3}\right) - 1$ - ۱

$$-1 \leq \sin\left(x + \frac{\pi}{3}\right) \leq 1 \Rightarrow 0 \leq \sin^2\left(x + \frac{\pi}{3}\right) \leq 1 \Rightarrow$$

$$0 \leq 2 \sin^2\left(x + \frac{\pi}{3}\right) \leq 2 \Rightarrow -1 \leq 2 \sin^2\left(x + \frac{\pi}{3}\right) - 1 \leq 1$$

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

ب) $g(x) = 3 \cos^3 x - 4$

$$-1 \leq \cos x \leq 1 \Rightarrow -1 \leq \cos^3 x \leq 1 \Rightarrow -3 \leq 3 \cos^3 x \leq 3$$

$$-7 \leq 3 \cos^3 x - 4 \leq -1 \quad R_g = [-7, -1]$$

$$-3 \leq x < -2 \Rightarrow |x| = -x \Rightarrow \frac{x}{|x|} = -1 \Rightarrow y = -4$$

$$[x] = -3$$

$$-2 \leq x < -1 \Rightarrow |x| = -x \Rightarrow \frac{x}{|x|} = -1 \Rightarrow y = -3$$

$$[x] = -2$$

$$-1 \leq x < 0 \Rightarrow |x| = -x \Rightarrow \frac{x}{|x|} = -1 \Rightarrow y = -2$$

$$[x] = -1$$

$$0 \leq x < 1 \Rightarrow |x| = x \Rightarrow \frac{x}{|x|} = 1 \Rightarrow y = 1$$

$$[x] = 0$$

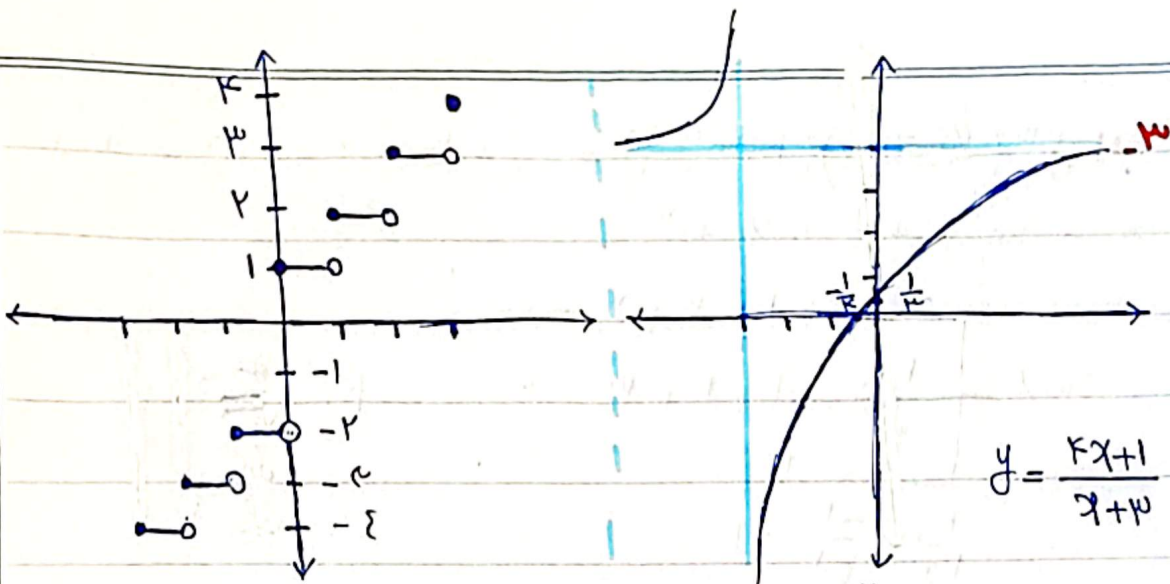
$$1 \leq x < 2 \Rightarrow |x| = x \Rightarrow \frac{x}{|x|} = 1 \Rightarrow y = 2$$

$$[x] = 1$$

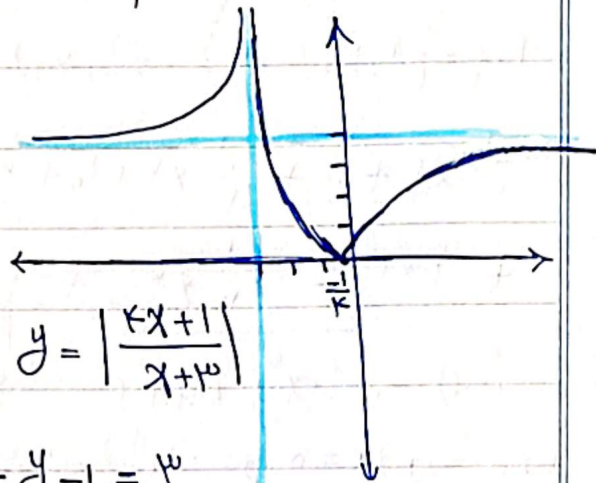
$$2 \leq x < 3 \Rightarrow |x| = x \Rightarrow \frac{x}{|x|} = 1 \Rightarrow y = 3$$

$$x = 3 \rightarrow y = 4 \quad [x] = 2$$

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ابتداءً نمودار $y = \frac{4x+1}{x+3}$ را می‌کشیم. محورهای تقاطع با محاور
افقی $y = 4$ و عمودی $x = -3$ است.
رسم می‌کنیم و سپس قسمت‌های زیر محاور را
رسم می‌کنیم. نسبت به محور x و y قرینه می‌کنیم.



$$2 - x + y - 1 = 3$$

$$y = x + 2$$

$$x - 2 + y - 1 = 3$$

$$\Rightarrow y = -x + 4$$

$$2 - x + 1 - y = 3$$

$$\Rightarrow y = -x$$

$$x - 2 + 1 - y = 3$$

$$\Rightarrow y = x - 4$$

الف) $f(x) = x + \frac{1}{x} + 2\sqrt{x + \frac{1}{x}} \rightarrow x + \frac{1}{x} \geq 0$

$$= \left(\sqrt{x + \frac{1}{x}}\right)^2 + 2\sqrt{x + \frac{1}{x}}$$

$\sqrt{x + \frac{1}{x}}$	$\xrightarrow{+\infty}$	$2 + 2\sqrt{2}$
	$\rightarrow$	$+\infty$

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

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$$\frac{-b}{2a} = \frac{-1}{1} = -1$$

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

$\sin x \begin{cases} -1 \rightarrow -1 - 2 + 3 = 0 \\ 1 \rightarrow -1 + 2 + 3 = 4 \end{cases} \Rightarrow R_f = [0, 4]$
 $\frac{-b}{2a} = \frac{-2}{-2} = 1$

$D_f = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$ $\frac{9 \times 10}{9} = 10 \leftarrow -4$

$\frac{1}{10} \times 1 + 10 + \frac{1}{10} \times 2 + 10 + \dots + \frac{1}{10} \times 9 + 10 = \frac{1}{10}(1 + 2 + \dots + 9)$
 $+ 9 \times 10 = \frac{1}{10} \times 45 + 90 = 90 - 4.5 = 85.5$

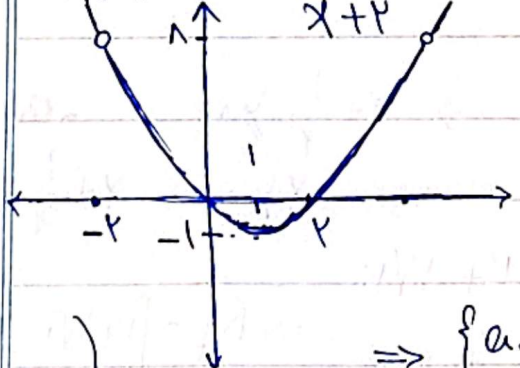
$f(x) = \sqrt{ax^2 + bx + c} \leadsto ax^2 + bx + c \geq 0$ $-v$
 این رابطه فقط برای $x \geq 2$ برقرار است $\leftarrow$ رابطه خطی است و $a=0$ و $a=0$ و $a=0$

$f(2) = \sqrt{4b + c} = 1 \Rightarrow 4b + c = 1, 2b + c = 0 \leftarrow$ بسط

$\begin{cases} 4b + c = 1 \\ 2b + c = 0 \end{cases} \Rightarrow b = 1, c = -2 \Rightarrow g(x) = \sqrt{x^2 + 2}$
 $\rightarrow \min \Big|_K$

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

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



$x^2 - 2x = 1$

$\Rightarrow x^2 - 2x - 1 = 0 \Rightarrow (x-3)(x+1) = 0$

$\Rightarrow x = 3, x = -1$

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

$\rightarrow \min \Big| \frac{3-1}{2} = 1$
 $1 - 2 = -1$

$\leadsto R_f = [-1, +\infty) \Rightarrow c = -1 = 1 + 2 = 3$

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$$y = \sqrt[3]{x^3 + ax^2 + bx - 1} \xrightarrow{\text{بجای آوردن}} y = \sqrt[3]{(x-1)^3} = \dots -9$$

$$\sqrt[3]{x^3 - 4x^2 + 12x - 1} \Rightarrow a = -4, b = 12$$

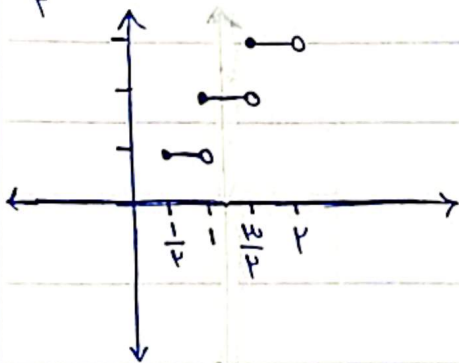
$$-4 \leq x \leq 12 \Rightarrow -1 \leq x-1 \leq 10 \Rightarrow R_f = [-1, 10]$$

$$y = [x] + \left[x + \frac{1}{p}\right] \dots -1.$$

$$\frac{1}{p} \leq x < 1 \Rightarrow 1 \leq x + \frac{1}{p} < \frac{p+1}{p} \Rightarrow [x] + \left[x + \frac{1}{p}\right] = 0 + 1 = 1$$

$$1 \leq x < \frac{p}{p} \Rightarrow \frac{p}{p} \leq x + \frac{1}{p} < 2 \Rightarrow [x] + \left[x + \frac{1}{p}\right] = 1 + 1 = 2$$

$$\frac{p}{p} \leq x < 2 \Rightarrow 2 \leq x + \frac{1}{p} < \frac{2p+1}{p} \Rightarrow [x] + \left[x + \frac{1}{p}\right] = 1 + 2 = 3$$



در ۰، ۱، ۲