



تاریخ: / /

علی خزان - تلف ۲۰

موضوع:

$$1 \quad \frac{1}{x-1} \leq |x-1| \rightarrow |x-1| \leq x^2 - 2x + 1 \leq \frac{1}{x-1}$$

$$\rightarrow x^2 - 2x \leq 0 \rightarrow x(x-2) \leq 0 \rightarrow \begin{cases} x \leq 0 \\ x \leq 2 \end{cases}$$

$$2 \quad (الف) \quad -2 < \frac{2x-1}{x} < 2 \rightarrow -2 < 2 - \frac{1}{x} < 2$$

$$-4 < -\frac{1}{x} < 0 \rightarrow x > \frac{1}{4}$$

$$ب) \quad \frac{x-2}{2x+1} > 1 \rightarrow \frac{x+3}{2x+1} < 0 \rightarrow -3 < x < -\frac{1}{2}$$

$$x \neq -\frac{1}{2}$$

$$\frac{x-2}{2x+1} < -1 \rightarrow \frac{3x-1}{2x+1} < 0 \rightarrow -\frac{1}{3} < x < \frac{1}{2}$$

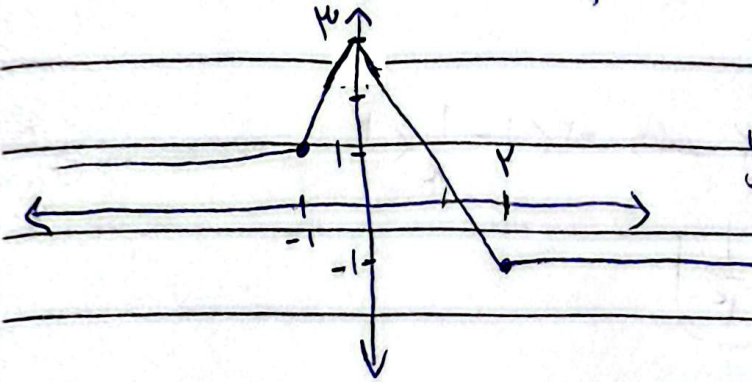
$$\rightarrow x \in (-3, \frac{1}{3}) - \left\{ -\frac{1}{2} \right\}$$

$$-x-4 < x^2 < x+4 \rightarrow \begin{cases} x^2 > -x-4 \rightarrow x^2+x+4 > 0 \quad \checkmark \\ x^2 < x+4 \rightarrow x^2-x-4 < 0 \rightarrow -2 < x < 4 \end{cases}$$

$$|x - \frac{1}{2}| < \frac{5}{2} \rightarrow x \in \left(-\frac{9}{2}, \frac{11}{2} \right)$$



	-1	0	1	
	$x+1+2x-x+2$	$x+1+2x-x+2$	$x+1-2x-x+2$	
	$3x+3$	$-2x+3$		
	1			



$$y_{\max} = 3 \rightarrow 3+6=9$$

$$y_{\min} = -1$$

$$y' = \left| \frac{1}{2}x + 1 \right| - 2 + 1 = \left| \frac{1}{2}x + 1 \right| - 1$$

$$\left| \frac{1}{2}x \right| - 2 = \left| \frac{1}{2}x + 1 \right| - 1$$

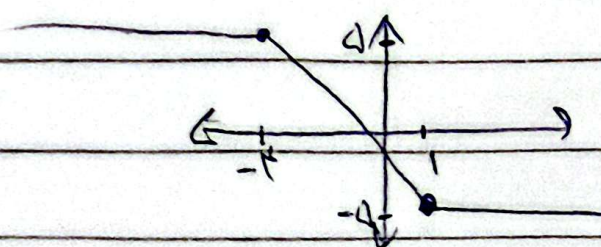
$$x \rightarrow |x| - 4 = |x+1| - 2 \rightarrow |x| - |x+1| \leq 0$$

	-1	0	
	$-x+x+1-2$	$-x-x-1-2$	$x-x-1-2$
	$-2x-1$	$-2x-3$	-1
	4		

$$\rightarrow -2x-3=0$$

$$\rightarrow x = -1.5$$

	-1	1	
	$-2x-3$	-1	
	4		



$$R_f = \{-1, -1, \dots, 1, 1\}$$

$$b) f(x) = \frac{1}{x} - \left[\frac{1}{x} + 1 \right] = \frac{1}{x} - \left[\frac{1}{x} \right] + 1 \quad -4$$

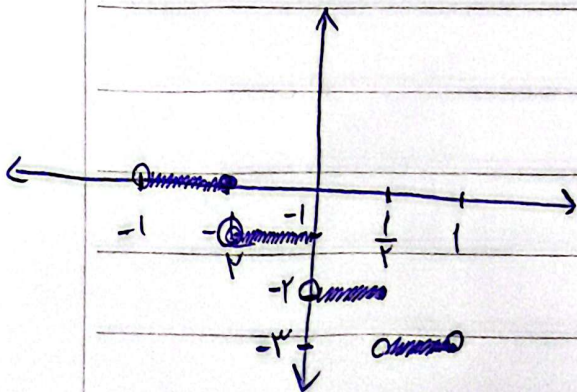
$$R_f = [1, 2)$$

$$الف) -1 < x \leq -\frac{1}{2} \rightarrow 1 \leq -2x < 2 \rightarrow y \leq 0 \quad -5$$

$$-\frac{1}{2} < x \leq 0 \rightarrow 0 \leq -2x < 1 \rightarrow y \leq -1$$

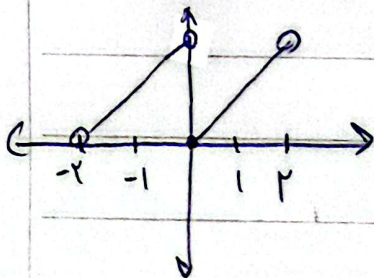
$$0 < x \leq \frac{1}{2} \rightarrow -1 \leq -2x < 0 \rightarrow y \leq -2$$

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



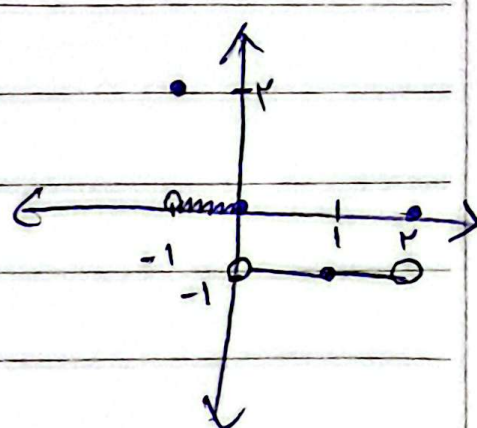
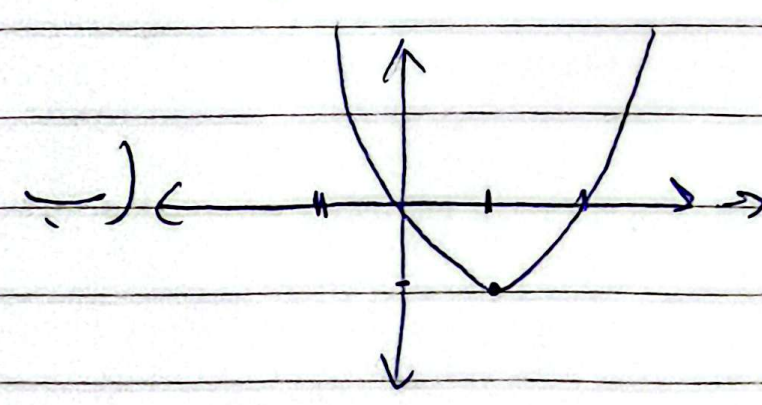
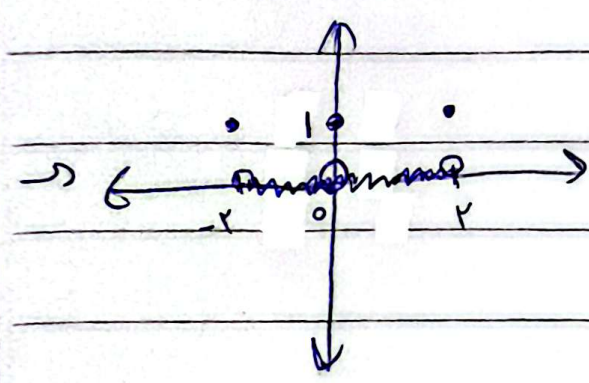
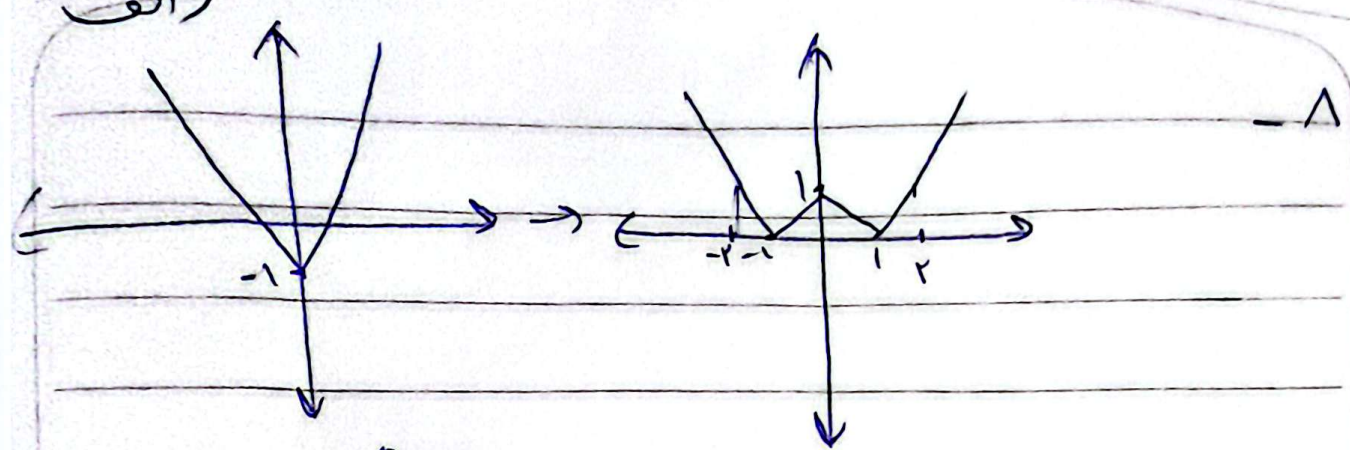
$$b) -2 < x < 0 \rightarrow \left[\frac{x}{2} \right] = -1 \rightarrow x - 2(-1) \leq x + 2 \leq y$$

$$0 \leq x < 2 \rightarrow \left[\frac{x}{2} \right] \leq 0 \rightarrow y = x$$





(الف)



$$[a] + [b] \leq 4$$

$$[b] - [a] \leq 2$$

$$[b] \leq 4 \rightarrow [b] \leq 3 \rightarrow b \leq 3, 4 \rightarrow a \leq 6, 2$$

$$(1 + \sqrt{2})^4 \leq 191 - (1 - \sqrt{2})^4$$

$$-1 < (1 - \sqrt{2}) < 0$$

$$0 < (1 - \sqrt{2})^4 < 1$$

$$191 < 191 - (1 - \sqrt{2})^4 < 191 \rightarrow [191 - (1 - \sqrt{2})^4] \leq 191$$