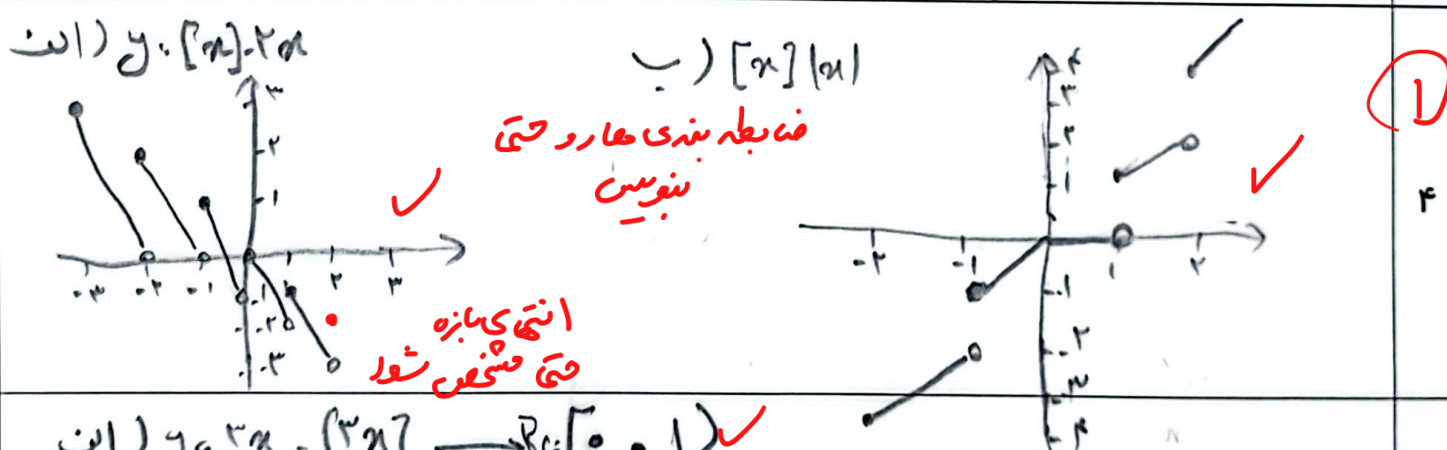
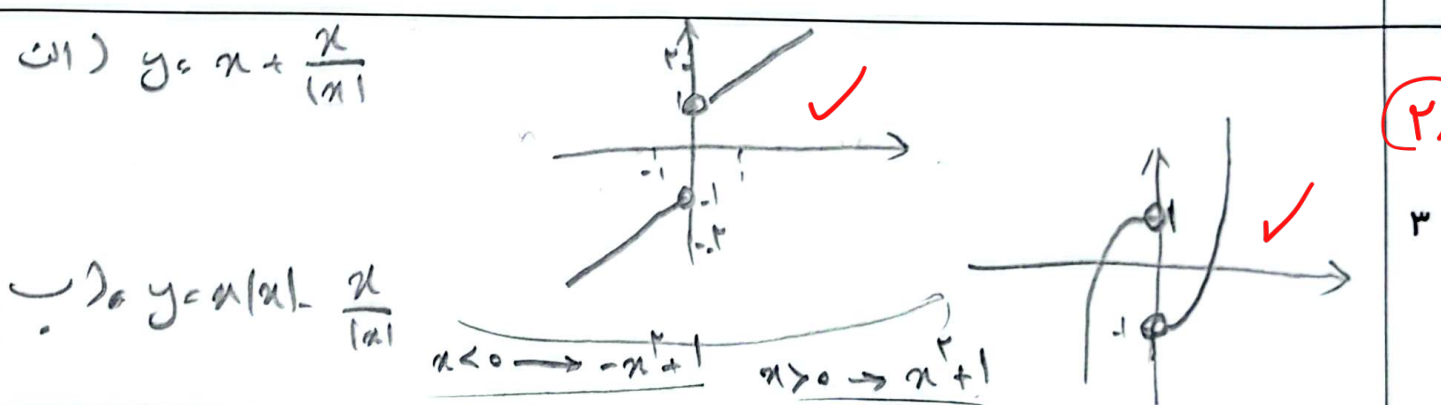


الف) $x + |2x - 4|$ $\xrightarrow{2} \begin{array}{c|c} 4-x & 3x-4 \end{array} \rightarrow y \geq 2 \quad R_f = [2, +\infty) \checkmark$ (2)

ب) $|x-1| + |x-1| - |x|$ $\xrightarrow{1} \begin{array}{c|c|c|c} 3-x & 3-x & 1-x & x-3 \end{array}$
 $y \geq 3 \leftarrow \begin{array}{c} 0 \leq y \leq 3 \\ 0 \leq y \leq -1 \end{array} \rightarrow y \geq -1 \Rightarrow R_f = [-1, +\infty) \checkmark$ 1

$|3x-3| - |x+2| - K = 0$ $\xrightarrow{-2} \begin{array}{c|c|c} 5-2x-K & 0-4x-K & 2x-5-K \end{array}$
 $y > 9-K \leftarrow \begin{array}{c} 3-K \leq y \leq 9-K \\ y > -3-K \end{array} \Rightarrow \boxed{K = -3} \checkmark$ (2)
 $K = 9 \times$
 (و در صورتی که)



الف) $y = 3x - [3x] \rightarrow R_f = [0, 1) \checkmark$ (2)

ب) $y = 4x - 4[x] \Rightarrow y = 4(x - [x]) \Rightarrow R_f = [0, 4) \checkmark$

ج) $y = x - 5[\frac{x}{5}] \Rightarrow y = 5(\frac{x}{5} - [\frac{x}{5}]) \Rightarrow R_f = [0, 5) \checkmark$

د) $y = [2x] - 2x \Rightarrow R_f = [-1, 0] \checkmark$ 5

$$\text{ا) } \sqrt{9+x^2} = \sqrt{13} \Rightarrow R_f = [-\sqrt{13}, \sqrt{13}] \checkmark$$

$$\text{ب) } y = R \sin x - R \cos x \xrightarrow{\sqrt{9+16}=5} R_f = [-5, 5] \checkmark$$

$$\text{ج) } y = [R \sin x + R \cos x] \rightarrow R_f = [-\sqrt{10}, \sqrt{10}] \rightarrow R_f = \{-\sqrt{10}, \sqrt{10}\} \checkmark$$

$$\text{د) } y = \sqrt{\cos x - R \sin x} \rightarrow R_f = [-\sqrt{10}, \sqrt{10}] \Rightarrow R_f = [0, \sqrt{10}] \checkmark$$

$$\text{ا) } \rightarrow 1 + R + R = 4$$

$$\rightarrow 1 - R + R = 0$$

$$\frac{-b}{R_a} = \frac{-R}{R} \times$$

$$R_f = [0, 6] \checkmark$$

$$\text{ب) } \rightarrow R + R + R = V$$

$$\rightarrow R - R + R = 1$$

$$\frac{-b}{R_a} = \frac{-R}{R}$$

$$R \times \frac{9}{16} = \frac{9}{R} + R = R - \frac{9}{R} = \frac{V}{R}$$

$$R_f = \left[\frac{V}{R}, V\right] \checkmark$$

$$\text{ا) } y = \sin^2 \alpha + R \cos^2 \alpha \xrightarrow{\sin^2 \alpha + \cos^2 \alpha = 1} y = 1 + R \cos^2 \alpha \rightarrow 1 \leq y \leq R$$

$$0 \leq \cos^2 \alpha \leq 1$$

$$R_f = [1, R] \checkmark$$

$$\text{ب) } y = \frac{R \cot \alpha}{1 + \cot^2 \alpha} = \frac{\frac{R \cos \alpha}{\sin \alpha}}{\frac{1}{\sin^2 \alpha}} = R \sin \alpha \cos \alpha = \sin^2 \alpha \Rightarrow R_f = [-1, 1] \checkmark$$

$$\text{ا) } y = \sin^2 \alpha + \cos^2 \alpha = \sin^2 \alpha + \cos^2 \alpha \xrightarrow{R^{1-R} \leq \sin^2 \alpha + \cos^2 \alpha \leq 1} R^{1-R} \leq y \leq 1$$

$$\rightarrow R_f = \left[\frac{1}{R}, 1\right] \checkmark$$

$$\text{ب) } y = [\sin^2 \alpha + \cos^2 \alpha] \rightarrow R_f = \left[\frac{1}{R}, 1\right] \Rightarrow R_f = \{0, 1\} \checkmark$$

$$\text{ا) } y = \frac{(x+R)(R-x-1)}{x+R} = R-x-1 \xrightarrow{\text{if } x=R} y = -9$$

$$\Rightarrow R_f = \mathbb{R} - \{-9\} \checkmark$$

$$\text{ب) } y = \frac{x^2-1}{x-1} = \frac{(x-1)(x+1)}{x-1} = x+1$$

$$\frac{-b}{R_a} = \frac{-1}{R} \quad \frac{1}{R} - \frac{1}{R} + 1 = \frac{R}{R}$$

$$R_f = \left[\frac{R}{R}, +\infty\right) \checkmark$$