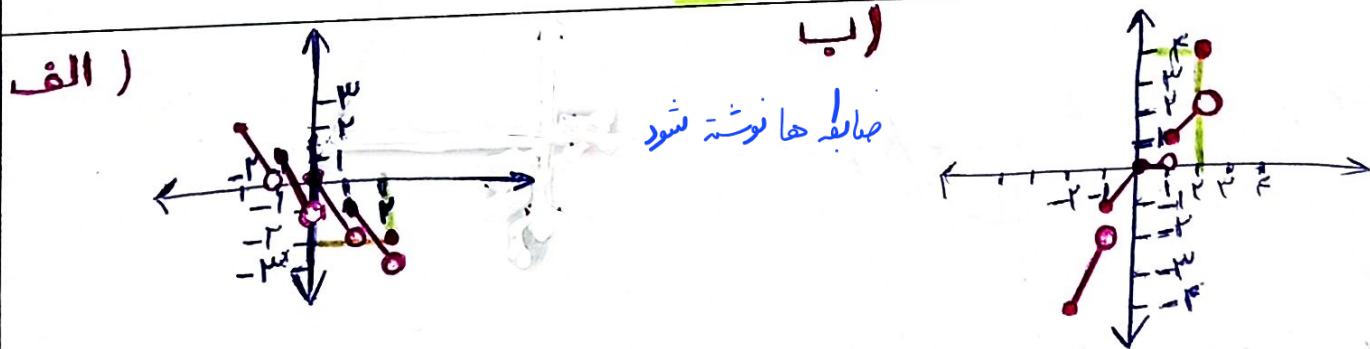
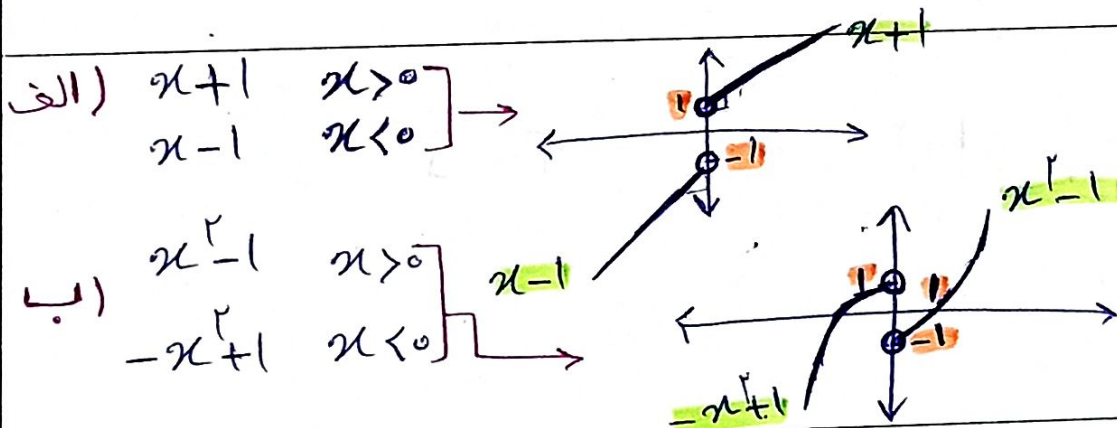
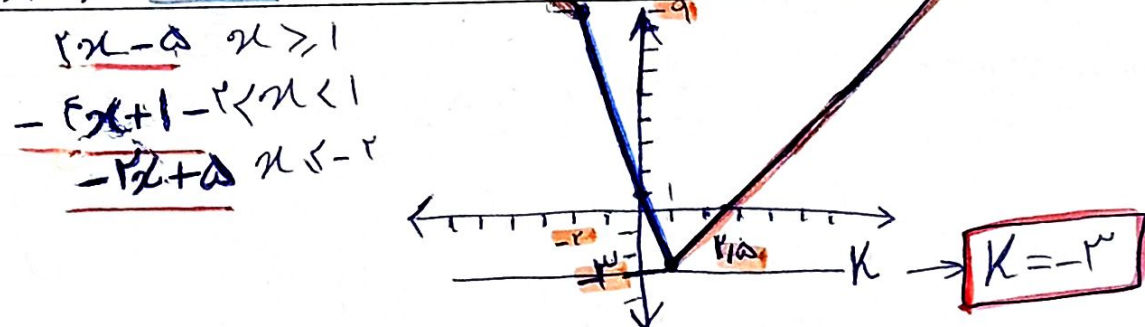


19,5

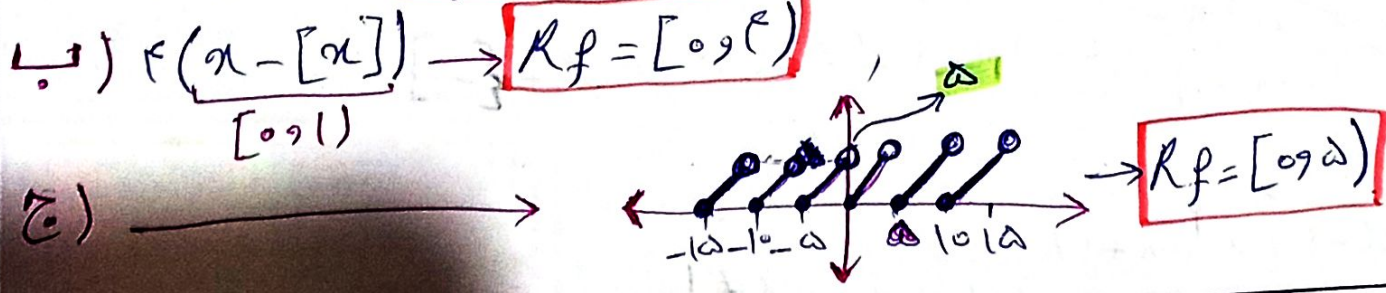
الف) $\begin{cases} 3x-4 & x \geq 2 \\ -x+4 & x < 2 \end{cases} \xrightarrow{\text{اجتماع و کسب}} R_f = [2, +\infty)$

ب) $\begin{cases} x-3 & x \geq 2 \\ -x+1 & 1 < x < 2 \\ -3x+3 & 0 \leq x < 1 \\ -x+3 & x < 0 \end{cases} \xrightarrow{\text{اجتماع و کسب}} R_f = [-1, +\infty)$



الف) $t - [t] \rightarrow R_f = [0, 1)$

ب) $[t] - t \rightarrow R_f = (-1, 0]$



الف) $-\sqrt{13} \leq 3\sin x + 2\cos x \leq \sqrt{13} \rightarrow R_f = [-\sqrt{13}, \sqrt{13}]$

ب) $R_f = [-5, 5]$

ج) $-\sqrt{29} \leq 2\sin x + 5\cos x \leq \sqrt{29} \rightarrow [2\sin x + 5\cos x] \rightarrow R_f = [-9, 5]$

$\rightarrow -9, -5, \dots, 5$

د) $-\sqrt{5} \leq \cos x - 2\sin x \leq \sqrt{5} \rightarrow R_f = [0, \sqrt{5}]$

الف) $\sin^2 x + 3\sin x + 2 \rightarrow \begin{cases} \sin x = 1 \rightarrow y = 6 \\ \sin x = \frac{b}{a} = \frac{3}{1} = 3 \\ \sin x = -1 \rightarrow y = 0 \end{cases} \rightarrow R_f = [0, 6]$

ب) $2\sin^2 x + 3\sin x + 2 \rightarrow \begin{cases} \sin x = 1 \rightarrow y = 7 \\ \sin x = \frac{-b}{2a} = \frac{-3}{2} = -\frac{3}{2} \rightarrow y = \frac{5}{2} \\ \sin x = -1 \rightarrow y = 1 \end{cases} \rightarrow R_f = [\frac{5}{2}, 7]$

الف) $\frac{1 - \cos^2 x}{\sin^2 x} + 5\cos^2 x = 1 + 3\cos^2 x \rightarrow R_f = [1, 4]$

ب) $\frac{\frac{2\cos x}{\sin x}}{\frac{1}{\sin^2 x}} = 2\sin x \cos x = \sin 2x \rightarrow R_f = [-1, 1]$

الف) $1 - K \leq \frac{\sin^2 x + \cos^2 x}{\sin^2 x + \cos^2 x} \leq 1 \rightarrow R_f = [\frac{1}{K}, 1]$

ب) $\frac{1}{K} \leq \sin^2 x + \cos^2 x \leq 1 \rightarrow [\sin^2 x + \cos^2 x] \rightarrow R_f = \{0, 1\}$

الف) $\frac{(x+1)(2x-1)}{(x+1)} = 2x-1, x \neq -1 \rightarrow R_f = K - \{-1\}$

ب) $\frac{(x-1)(x^2+x+1)}{(x-1)} = x^2+x+1, x \neq 1 \rightarrow R_f = [\frac{5}{4}, +\infty) - \{1\}$

