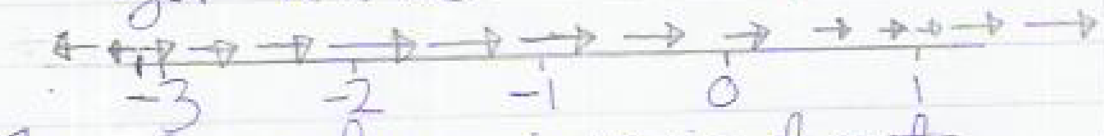
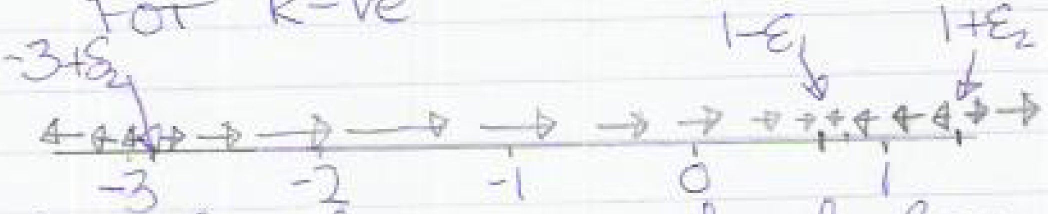
to $x=-3+\delta_2$ but it's nature is unchanged.
The phase diagram for the system becomes.

for k +ve.



The elementary invariant sets become $(-\infty,-3-\delta_1)$ and $(-3-\delta_1,\infty)$ together with the fixed point at $x=-3-\delta_1$ (three elementary invariant sets plus two fixed points become two elementary invariant sets plus one fixed point)

For k −ve



The elementary invariant sets become $(-\infty,-3+\delta_2)$, $(-3+\delta_2,1-\varepsilon_1)$, $(1-\varepsilon_1,1+\varepsilon_2)$ and $(1+\varepsilon_2,\infty)$ together with the fixed points $x=-3+\delta_2$, $1-\varepsilon_1$ and $x=1+\varepsilon_2$ so three elementary invariant sets and two fixed points become four elementary invariant sets and three fixed points

$\frac{5}{5}$

b) $V_1(x)=\sqrt{V(x)}=\sqrt{x^3+x^2-5x+3}$ $\quad -3\leq x\leq 1$

$\therefore V_1(x)=\sqrt{(x-1)^2(x+3)}=(1-x)\sqrt{x+3}$

(since $V_1(x)\geq 0$, and $(1-x)\geq 0$ for $-3\leq x\leq 1$, then we can take the +ve root of $\sqrt{x+3}$)

$\therefore$ Since x is restricted to the range $[-3,1]$, where the points $x=-3,1$ (the fixed points) are included in the allowed values of x. The values $x=-3,1$ are natural boundaries, by restriction.