Homework #7

Problem 2:

If $\vec{E} \neq 0$ and $\vec{B} = 0$ in K, we know that

$$2(E^2 - B^2) = 2(E'^2 - B'^2)$$

$$2(B^2 - E^2) = 2(B'^2 - E'^2)$$

$$\vec{E}.\vec{B} = \vec{E}'.\vec{B}'$$

In our case

$$2E^2 = 2(E'^2 - B'^2)$$

$$-2E^2 = 2(B'^2 - E'^2)$$

$$0 = \vec{E}'.\vec{B}'$$

If $\vec{E}' = 0$, this means that $E^2 = -B'^2$. But $E^2 \geq 0$ and $B'^2 \geq 0$, therefore it is not possible.
The same happens if we assume $\vec{E} = 0$ and $\vec{B}' = 0$, we obtain $-2B^0 = 2E'^2$ and $2B^2 = -2E'^2$