Irreversible decompression

Consider an insulating box with two compartments. Each compartment initially contains $N$ atoms of a monatomic classical ideal gas in equilibrium at initial pressures $p_1 \neq p_2$ and at the same initial temperature $T$. Gas atoms are then allowed to leak through a hole in the dividing wall.

(a) Show that the temperature remains the same in the final equilibrium state.
(b) Find the uniform pressure $p$ in the final equilibrium state as a function of $p_1$ and $p_2$.
(c) Find the increase in total entropy, $\Delta S$, between the initial and final equilibrium states.

Solution: