[tex204] Triple point phase changes III

A cylinder with vertical axis has insulating and rigid walls and is capped by an insulating piston. The cylinder contains $m_s^{(0)} = 1$g of ice, $m_l^{(0)} = 2$g of water, and $m_g^{(0)} = 5$g of H_2O vapor in thermal equilibrium. The two processes described below start from this state. Assume that the difference in densities between the liquid and solid phases is negligibly small.
(i)The piston is quasistatically moved in until the temperature begins to change. What are the masses $m_s^{(1)}, m_l^{(1)}, m_g^{(1)}$, of ice, water, and vapor, respectively, at that point? How much work ΔW_1 does the piston do onto the gas to get to that point?
(ii) The piston is quasistatically moved out until the temperature begins to change. What are the masses $m_s^{(2)}, m_l^{(2)}, m_g^{(2)}$, of ice, water, and vapor, respectively, at that point? How much work ΔW_2 does the goes do onto the piston to get to that point?
Triple point temperature: $T = 273$K.
Triple point pressure: $p = 611\text{N/m}^2$.
Latent heat of melting: $L_{sl} = 335$J/g.
Latent heat of vaporization: $L_{lg} = 2495$J/g.
Vapor mass density at triple point: $\rho = 600\text{g/m}^3$.

Solution: