[tex156] Triple point phase changes II

A cylinder with rigid and insulating walls 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) How much heat ΔQ_1 can be added before the temperature begins to increase? What are the masses $m_s^{(1)}, m_l^{(1)}, m_g^{(1)}$, of ice, water, and vapor, respectively, at that point?
(ii) How much heat ΔQ_2 can be extracted before the temperature begins to decrease? What are the masses $m_s^{(2)}, m_l^{(2)}, m_g^{(2)}$, of ice, water, and vapor, respectively, at 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.

Solution: