[tex123] Discontinuous transition: change in internal energy

Consider a discontinuous transition in a simple fluid system. The latent heat is $L(T)$ and the coexistence curve is $p = p(T)_{\text{coex}}$. Show that the change in internal energy during the phase transition is

$$\Delta U = L(T) \left[1 - \left(\frac{d \ln p(T)_{\text{coex}}}{d \ln T} \right)^{-1} \right].$$

Solution: