It is possible to estimate the amount of atmospheric cooling and hence destabilization from synoptic-scale lift using a simplified form of the thermodynamic energy equation Eq. (2.2):

$$\frac{\partial T}{\partial t} \approx -w\left(\frac{\partial T}{\partial z} + \Gamma_d\right),$$

where $\Gamma_d = g/c_p$. [It is left as a separate exercise for reader to derive this equation, which makes use of Eqs. (2.3), (2.9), and the hydrostatic balance equation; contributions from diabatic heating and horizontal advections are neglected.] Compute the adiabatic ascent necessary to locally cool an atmospheric layer by 2° over 4 hrs. Assume that the average lapse rate of this layer is 7° km^{-1}. Comment on the heights or levels that this magnitude of ascent is reasonable.