ATM 418 Homework # 6
Due 4:00 PM Monday 11 Dec.

Answer the following questions on a separate sheet of paper. **SHOW ALL WORK!**

1. Derive the mean thermodynamic equation from the Boussinesq set of equations given in the notes. Hint: Use similar steps to what we used in class for the momentum equations.

2. The wind at Albany International Airport is $10 \text{ m s}^{-1}$ at $240^\circ$. The pressure is 1010 hPa, which is 4 hPa higher than Glens Falls, and the temperature is $5^\circ \text{C}$. Determine the drag coefficient at this location assuming the boundary layer top is 300 m above the ground.

3. At sunrise, a station measures a potential temperature profile that has the form $0.000005 \times z^2 + 290$ for $0 \text{ km} \leq z \leq 1 \text{ km}$ and $\theta = 320 \text{ K}$ above that ($z$ given in meters). How long would it take the profile to become well-mixed (i.e., $\theta =$ constant) assuming $K_h = 0.01 \text{ m}^2 \text{ s}^{-1}$ and no mean vertical motion?