

AOS 100/101
Spring 2008

HOMEWORK #5
(Due Fri. April 11)

Please provide concise, grammatically correct, neatly written answers to the following questions. All questions can be answered in, at most, a few sentences. Don't forget to write your name on the paper!!!

NAME:

- 1) Two saturated parcels of air, A and B, are lifted 1 km. Parcel A has a specific humidity of 20 g kg^{-1} . Parcel B has a specific humidity of 10 g kg^{-1} . Which parcel experiences the *lesser* rate of cooling upon being lifted? Explain your answer.
(10 pts)

- 2) This question will involve consideration of conditions observed on two different days. On Day One, the surface temperature is 25°C and the surface dewpoint is 15°C . On Day Two, the surface temperature is 25°C and the surface dewpoint temperature is 20°C . If cumulus clouds form on both days, on which of the two days is the *cloudbase* (i.e. the height of the bottom of the cloud) lower? Clearly explain the reasoning you used to arrive at your answer.
(10 pts)

- 3) Cloud properties are measured on two different days. On Day One, there are fewer cloud condensation nuclei (CCN) in the air than on Day Two. The exact same amount of *liquid* water is observed on the two different days. Why is the Day One cloud more likely to precipitate than the Day Two cloud?
(10 pts)

- 4) On a certain day the lapse rate over Madison is measured to be $5^\circ\text{C}/\text{km}$. If saturated surface air has a temperature of 15°C , will it be able to rise further on its own upon being lifted to a height of 1 km (i.e. will it be *positively buoyant* at 1 km)? Clearly explain the reasoning you used to arrive at your answer.
(10 pts)