

AOS 100/101  
Spring 2018

HOMEWORK #5  
(Due Fri. April 6)

*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) This problem involves consideration of two air parcels originally at the surface of the Earth. Parcel A is saturated and has a specific humidity of  $10 \text{ g kg}^{-1}$ . Parcel B has a relative humidity of 97% and a specific humidity of  $20 \text{ g kg}^{-1}$ . Which parcel experiences a larger temperature decrease upon being lifted 1 km? 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  $25^\circ\text{C}$  and the surface dewpoint is  $15^\circ\text{C}$ . On Day Two, the surface temperature is  $25^\circ\text{C}$  and the surface dewpoint temperature is  $20^\circ\text{C}$ . 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) higher? 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 in the clouds 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 summer morning you observe that the air near the surface is saturated and has a temperature of  $20^\circ\text{C}$ . A pilot friend of yours has taken an early morning flight and reports that the temperature at 2 km elevation is  $4^\circ\text{C}$ . Is it reasonable to expect thunderstorms to develop in the afternoon? Clearly explain the reasoning you used to arrive at your answer.

(10 pts)