Metr 201, Spring 2015  
Monteverdi Quiz #5 Key  
100 pts.

Answer in complete sentences under the question or on the back of the exam. Please write legibly.

A. Short Answer and Definitions. (5 points each for a total of 20 points in this section).

(a) Lifting Condensation Level  
The LCL is the level (elevation or pressure level) to which an air parcel must be lifted in order for condensation to occur (to which an air parcel must be lifted in order for its saturation mixing ratio to be decreased to its mixing ratio and a cloud base is found).

(b) Level of Free Convection  
The LFC is the elevation (or pressure level) to which an air parcel must be lofted above which it becomes warmer than the air around it at the same elevation. For absolutely unstable conditions the LFC is at the ground. For conditionally unstable conditions the LFC is at some level above the ground.

(c) Severe Thunderstorm  
Any thunderstorm producing (a) straight line winds exceeding 57 mph (50 knots); and/or (b) hail 1” in diameter or larger; and/or (c) a tornado is classified as severe.

(d) Equilibrium Level  
The level above the LFC in which the parcel ascent curve recrosses the Environmental Lapse Rate.

B. You are provided with the surface analysis at 1843 UTC 3 April 2012 (Figure 1 at rear of test). Note the boundary indicated by the arrow. It is the dry line. (20 points).

Examine the weather information on either side of the dry line. Now briefly describe why that weather information is consistent with the fact that the dry line is analyzed in the location shown. [Caution: it is up to you to decide what weather information is consistent with the analyzed dry line.]
The dry line is a boundary between warm dry air and warm moist air along which the dry air, characteristically, is advancing. The surface plot on 1843 UTC 3 April showed that temperatures in the mid and upper 70s and dew points in the 20s to 40s with westerly or northwesterly winds were occurring west of the analyzed dry line. East of the dry line, temperatures were similar, but dew points were in the 60s, with southerly winds. Hence, the boundary drawn was on the leading edge of much drier warmer air converging with the moist air with similar temperatures further east.
C. Units. (5 pts each for a total of 20 pts)
Provide the metric system units used conventionally for the following:

\[ \mathbf{V} \quad \text{m/s or km/h or m s}^{-1} \text{ or km h}^{-1} \]
\[ \mathbf{u} \quad \text{m/s or km/h or m s}^{-1} \text{ or km h}^{-1} \]
\[ \mathbf{V} \quad \text{m/s or km/h or m s}^{-1} \text{ or km h}^{-1} \]
\[ \mathbf{W} \quad \text{m/s or cm/s or cm s}^{-1} \]

D. You are provided with the Fort Worth sounding for 1200 UTC 3 April 2012 (Figure 2 at rear of test). The parcel ascent curve is shown, with regions in which the ascent curve is to the right of the ELR shaded red, and regions in which the ascent curve is to the left of the ELR shaded blue. The winds at every elevation are also shown on the right margin. (25 points).

1. Indicate the LFC and EL (Equilibrium Level) right on the sounding (10 pts)
2. Is the lofted air parcel warmer or colder than the air around it at the same elevation at 500 mb?
   __ Warmer. Specifically: \(-8 ^\circ \text{C} - (-1 ^\circ \text{C}) = 5 ^\circ \text{C} \) (5 points)
3. What is the initial forecast storm motion of a thunderstorm, if one developed and how did you tell? (10 pts) The initial forecast storm motion would be form southwest to northeast. I could tell this by looking at the winds at 500 mb.

E. You are provided with specific Tornado Outlook for 8 April 2015 (15 points).

The innermost (re) arrow encompasses a region of the country where the risk of tornadoes somewhere within that region is 100%, yet the area is labeled 15% or greater. Explain.

There is 100 % of tornadoes within that large region, but that does not ascribe the relative risk that a tornado would be close by. The 15% refers to the chances that a tornado will be within 25 miles of a point, in that region, where a circle with a radius of 25 miles basically encompasses the size of most urban regions in that area.
Figure 1: Surface analysis for 1843 UTC 3 April 2012
Figure 2: Fort Worth Sounding for 12 UTC 3 April 2012, with parcel ascent curve indicated.
Figure 4: Tornado Outlook from Day 1 Convective Outlook for 8 April 2015