Meteorology 3510 Exercise #6 Due Tuesday, March 4, 2008

This exercise deals with dry adiabatic processes and the skew T-log p chart.

- 1. To help you get familiar with SkewT/Log-P Diagram, you are strongly encouraged to use the Skew-T Mastery program. To get started, go to the URL http://www.meted.ucar.edu/mesoprim/skewt (or use the Skew-T Mastery link on the class web page). You need to register first. You do not need to enter anything for supervisor/instructor's E-mail. After you register, work through the Introduction, Skew-T Description, and Parameters sections, including the following material in the Parameters subsection (all of the items under Moisture/Humidity and the items down to Lifting Condensation Level under Temperatures/Levels).
- 2. Consider a parcel that ascends dry adiabatically from p = 1000 mb, where $T = 20^{\circ}$ C and relative humidity = 50%, to its *saturation pressure* (also known as *lifting condensation level*, or LCL.)

Use the skew T-log p chart and calculations (but only as needed) to obtain the quantities listed below for the parcel. *Plot the quantities at 25 mb intervals and at the LCL on the accompanying graph.* Use colored pencils as indicated to plot the variables.

- (a) Relative humidity (black).
- (b) Vapor pressure, e (red); saturation vapor pressure, e_s (blue).
- (c) Mixing ratio, w (red); saturation mixing ratio, w_s (blue).

(d) Potential temperature, θ (green); temperature, T (red); dewpoint temperature, T_d (blue).

- 3. Use the skew T-log p chart and calculations (but only as needed) to obtain the quantities listed below for a parcel that ascends adiabatically from p = 1000 mb, where $T = 10^{\circ}$ C and relative humidity = 50%, to its LCL. Plot the quantities at 25 mb intervals on a new graph.
 - (a) Relative humidity.
 - (b) e (red), e_s (blue).
 - (c) w (red), w_s (blue).
 - (d) θ (green), T (red), T_d (blue).
- 4. For the parcel described in Problem 3, determine its saturation pressure p_s (or LCL) and saturation temperature T_s .

p	RH	e	e_s	w	w_s	θ	T	T_d	T_v
(mb)	(%)	(mb)	(mb)	(g/kg)	(g/kg)	(K)	(K)	(K)	(K)
700									
725									
750									
775									
800									
825									
850									
875									
900									
925									
950									
975									
1000									

p	RH	e	e_s	w	w_s	θ	T	T_d	T_v
(mb)	(%)	(mb)	(mb)	(g/kg)	(g/kg)	(K)	(K)	(K)	(K)
700									
725									
750									
775									
800									
825									
850									
875									
900									
925									
950									
975									
1000									



