Atmospheric Sciences 5300
Exercise #2
Due Monday, September 12, 2022

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 `http://www.meted.ucar.edu/mesoprim/skewt` (or use the *Skew-T Mastery* link on the class web page). You need to register first. Please enter `steve.krueger@utah.edu` for the supervisor/instructor's E-mail. After you register, work through *UNIT 1 - Skew-T Description*, including Introduction, Lines on the skew-T, and Sounding Data (Temperature/Dewpoint only), and *UNIT-2 Parameters*, 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*). There is no quiz to take at this time.

2. Consider a parcel that ascends dry adiabatically from $p = 1000$ mb, where $T = 20°C$ 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. *Tabulate and plot the quantities at 25-mb intervals on the first accompanying table and on a graph. Also plot the quantities at the LCL on the graph.* Use colored pencils (optional) 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 $T = 10°C$ and relative humidity $= 50\%$, to its LCL. Tabulate and plot the quantities at 25-mb intervals on the second accompanying table and on a new graph. Also plot the quantities at the LCL on the 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 (mb)	RH (%)	e (mb)	e_s (mb)	w (g/kg)	w_s (g/kg)	θ (K)	T (K)	T_d (K)	T_v (K)
700									
725									
750									
775									
800									
825									
850									
875									
900									
925									
950									
975									
1000									

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