Name:_____ Section: _____ TA: Celeste / Sarah / Ken

ATM S 101 HOMEWORK 4. Winter 2004
Due Thursday Feb 19th in class.

Answer in the spaces provided. Include working where appropriate, not just the numerical answers.

1. Use the following list of cloud types to fill in the blanks below:
Cirrus, Stratus, Cumulus, Advection Fog, Radiation Fog, Lenticular, Cumulonimbus

a.) A type of cloud that appears when air is lifted over a mountain (often seen over Mt. Rainier) _____

b.) This cloud appears when warm moist air blows over a chilly lake_____

c.) Hail forms in this type of cloud_____

d.) Thin wispy ice clouds_____

e.) Puffy white cotton ball like clouds _____

f.) Low layered clouds (most often seen in Seattle in the winter) _____

g.) Cloud that appears low to the ground after a cold clear night_____

_____[7 points]

2. a.) Describe the Bergeron process in YOUR OWN WORDS.

b.) In which of the following types of clouds would you MOST expect the Bergeron process to occur? JUSTIFY YOUR ANSWER!!
Cirrus, Stratus, Cumulus, Advection Fog, Radiation Fog, Lenticular, Cumulonimbus

_____[4 points]

3. Explain how each of the following affects the growth of a CLOUD droplet:

a.) Curvature effect

b.) Solute effect

_____[4 points]

4. How do the following affect the growth of RAIN drops?

a.) Dependence of fall speed on size

b.) Presence of ascending air currents in deep convective clouds

c.) Coalescence

_____[6 points]

5. Consider two cities, A and B. Each has a surface pressure of 1000mb. The air temperature over city A is 20C and over city B it is 5C. SHOW ALL OF YOUR WORK!

a.) Calculate the average surface density of the air over each city. (Remember to express pressure in Pascals for all calculations)

b.) Using the answer from part (a) (assuming that density doesn't change with height), and the hydrostatic approximation (consider the acceleration due to gravity to be 9.8 m/s^2), determine:

i.) How high you have to go over each city to reach 900mb.

ii.) The pressure at 1km ABOVE each city.

c.) Consider an air parcel located halfway between A and B, with a density equal to the average of the densities of the two cities. If A and B are 1000km apart, calculate the horizontal acceleration (also note direction of acceleration) that this parcel may experience if it were located:

i.) At the surface

ii.) At 1km above the surface

_____[10 points]

6. During the cloud in a bottle experiment performed in section, we had to put smoke into the bottle before we could get cloud formation. Explain why this was necessary.

_____[2 points]

7. Place the following words in the blank that BEST FITS: scattering, refraction, diffraction, and reflection:

a.) The rainbow effect you see when you hold a prism in the light is an example of _____.

b.) While driving on a sunny day, you are blinded by light from the window of the car ahead of you. This is _____.

c.) Steam from a pot of boiling water looks whitish due to _____.

d.) You can occasionally see corona around the moon. The corona is due to _____.

[4 points]