Name: _____ Section/TA: _____

Atmospheric Sciences 101, Spring 2003

Homework #7–Due the beginning of section Thu/Fri, 5/6 June 2003

Note: No late homework will be accepted, as solutions will be posted Friday, June 6 at 5pm.

1. Take an empty cup or mug which has opaque sides (not glass) and place a penny on the bottom. View the cup at an angle so that the penny is just below the edge of the cup and is not visible to you. While keeping your eyes at this angle, pour water into the cup, or have someone else do it. (If this doesn't seem to work the first time try a different size mug with more water.)

a. What do you observe, and what physical process is responsible?

b. Draw a diagram of the experiment, showing what happened before and after the addition of the water. Include the path of light rays into your eyes. (Hint: see lecture 31)

2. For the following indicate (by circling) what must light interact with to produce each of the following optical phenomena.

a. 22° or 46° Halo (water droplets / ice crystals / air molecules)
rainbow (water droplets / ice crystals / air molecules)
sundog (water droplets / ice crystals / air molecules)
blue sky (water droplets / ice crystals / air molecules)
sun pillar (water droplets / ice crystals / air molecules)
glory (water droplets / ice crystals / air molecules)

b. Explain how a corona forms? Be sure to discuss how it differs from the way that haloes and rainbows form.

3. It is a very hot day in the desert. You and your thirsty partner look out across the desert valley and see a large pool of clear water. Since you have taken Atmospheric Sciences 101, you know, alas, that it is only a mirage. What type of mirage is it? Sketch the atmospheric temperature profile near the surface that is needed to produce such a mirage. For comparison, show the dry adiabatic lapse rate in your sketch.

4.

a. Why are burn bans instated during times of atmospheric temperature inversions?

b. Why do subsidence inversions lead to more severe pollution events than radiation inversions?

c. What is the role of topography and wind in determining the severity of a pollution event?

d. Why would you expect to see a maximum in the tropospheric ozone concentration in late afternoon?

e. What is the difference between London smog and LA smog?