

AOS 100/101
Spring 2017

HOMWORK #4
(Due Fri. March 17)

Please provide concise, grammatically correct, neatly written answers to the following questions. All questions can be answered in, at most, a few sentences. Don't forget to write your name on the paper!!!

NAME:

- 1) What type of fog might be formed when warm, moist air from southern Illinois surges northward and overruns newly fallen snow in Madison? Explain the physical mechanism by which this fog is formed. (10 pts)
- 2) The *relative humidity* (RH) on a cold January day in Madison is 90% while on a hot July day the RH is only 65%. The *absolute humidity* is found to be higher on the July day. Explain this apparent paradox. (The explanation must refer to the definitions of relative humidity and absolute humidity). (10 pts)
- 3) Would your skin feel cooler upon stepping out of the shower in your home ($T=22^{\circ}\text{C}$, $T_d=12^{\circ}\text{C}$) or upon stepping out of a swimming pool in Palm Springs, CA ($T=37^{\circ}\text{C}$, $T_d=-1^{\circ}\text{C}$)? Explain your answer with reference to the relationship between relative humidity and evaporation rate. (10 pts)

EXTRA CREDIT :

Calculate the mass of water sufficient to cover the surface of the Earth with 1" of liquid. (This is the equivalent amount of water vapor contained in the Earth's atmosphere at any instant in time). You need to know that 1" is equivalent to 0.0254 m, the radius (R) of the Earth is 6,370,000 m, the surface area of a sphere is $4\pi R^2$, and the density of water is 1000 kg m^{-3} . (You may approximate π as 3.14). You must show your all your work to get credit.

(10 pts)