Atmospheric Sciences 301   Name_____

Autumn 2016

Homework #1   Due Monday, October 10

Due: Thursday, October 5, 2006 at the <u>beginning</u> of class Please show your work.

1.   Fill in the blanks:

98.6°F= _____ °C = _____ °K
25°C= _____ °F = _____°K
190°K= _____ °C = _____ °F
14.7 lb/in$^{2=}$ _____ inches of Hg = _____ mb = _____ hPa

10 knots= _____ mph = _____ m/s

25 cm= _____ inches

70 feet= _____ m

5 miles= _____ km

2.   A particular field of snow is heavily crusted over. This crust can support a pressure of 1 lb. per square inch before it collapses. A 240-lb. man with skis 3 inches wide and 60 inches long tries to ski over the snow. What is the pressure (lbs. per square inch) on the snow due to skis? Will the skier collapse the snow crust?

3.   On a clear night the temperature at a surface station fell from 25°C to 15°C. Fog began to form when the temperature reached 17°C. What is the dew point temperature?

4.   If we used a liquid twice as dense as mercury in a barometer, approximately how high would the column of that liquid be under normal sea level conditions?

5.   How much does the kinetic energy of the wind change as wind speed increases by 50%? Since the wind's kinetic energy is a measure of its destructive power, what does that imply regarding damage?

6. In class we talked about the Torricelli barometer, in which a long test tube full of
        mercury was inverted into a dish of mercury (see figure below). Assuming
        that the atmospheric pressure is P, answer the following:

a. At point A in the test tube, located at the height of the top of the mercury in the dish, what is the downward pressure forced by the mercury column?
b. At point B at the top of the mercury column, what is the pressure?
c. If the atmospheric pressure increases, what will happen to the height of the mercury column?
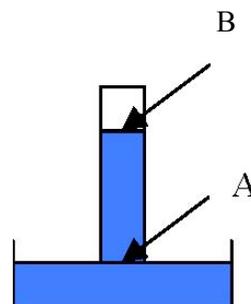
7. At absolute zero, atoms and molecules stop moving. What would the pressure be at that temperature?