Name: _____

Student #: _____

Quiz Section: _____

Homework #1

Due: Tuesday, October 8, 2013 at the <u>beginning</u> of class

Please show all your work. Attach these sheets to the front.

1. A particular field of snow is heavily crusted over. This crust can support a pressure of 1 pound per square inch (psi) beyond ambient atmospheric pressure before it collapses. A 216-pound man with skis 3 inches wide and 60 inches long tries to ski over the snow. What is the pressure in psi on the snow due to the skier? Will the snow crust collapse?

2. 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 19°C. What was the dew point temperature at the beginning of the night?

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

4. How would the molecular motion (kinetic energy) compare between two equal volumes of water, one at 10°C and one at 50°F?

5. In class we discussed the Torricelli barometer, in which a long test tube filled with mercury is inverted into a dish of mercury (see figure). 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 due to the mercury column?

   b. At point B at the top of the mercury column, what is the pressure?

   c. If atmospheric pressure increased, what would happen to the height of the mercury column?
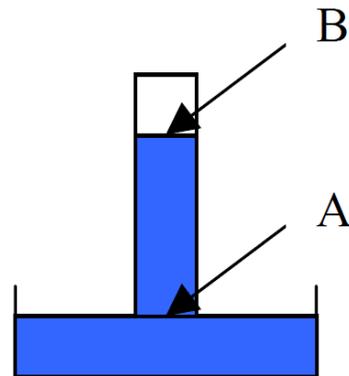
6. At absolute zero, atoms and molecules stop moving. What would the pressure be at that temperature?

7. Fill in the following charts (each row is a separate problem):

Temperature conversions:

	°C	°F	K
Freezing point of water			
Boiling point of water			
"Room temperature"		68	
Human body temperature		98.6	
Standard ambient temperature	25		

Pressure conversions:

psi	in Hg	mm Hg	mb or hPa
14.7			
			850
			500

Wind speed conversions:

kts	mph	ms^{-1}
20		
	20	
		20