Ch. 13 Worksheet

1. One method of taking measurements at high altitudes is to attach the scientific equipment to helium-filled balloons and allow them to rise into the atmosphere. Assume that such a balloon is lifted from ground level where the pressure is 1.0 atm temperature is 10.0 °C to an altitude where the temperature is -50.0 °C. If the volume increases by a factor of 20.0, what is pressure inside the balloon?

2. The escape velocity from the Moon is much smaller than from Earth and is only 2.38 km/s. At what temperature would hydrogen molecules (molecular mass is equal to 2.016 g/mol) have an average velocity v_{rms} equal to the Moon's escape velocity?

3. In the deep space between galaxies, the density of atoms is as low as 1.0×10^6 atoms/m^3, and the temperature is a frigid 2.7 K.
    a. What is the pressure?
    b. What volume (in m^3) is occupied by 1.0 mol of gas?
    c. If this volume is a cube, what is the length of its sides in kilometers?