1. (3) In an adsorption experiment, the manifold volume is calibrated with a bulb having $V = 34.5 \text{ cm}^3$. Gas having $P = 207 \text{ Torr}$ is expanded from the bulb to the rest of the system (previously evacuated), giving $P = 79.3 \text{ Torr}$. Calculate the volume of the rest of the system.

2. (3) The volume just calculated includes a small connecting region between the calibration bulb and the manifold. Gas of $P = 195.2 \text{ Torr}$ is trapped in this section and then expanded into the manifold (previously evacuated), giving $P = 19.2 \text{ Torr}$. Calculate the volumes of (a) the connecting region and (b) the manifold.

3. (4) In a different system, a sample cell of volume $13.3 \text{ cm}^3$ is connected to a manifold having $V = 63.5 \text{ cm}^3$. The system is initially at $T = 299 \text{ K}$ with $N_2$ gas at $P = 178.3 \text{ Torr}$. Then the fat part of the sample cell is immersed in liquid $N_2$ ($77.0 \text{ K}$) and the pressure drops to $139.2 \text{ Torr}$. Calculate the "cold volume."

4. (6) Adsorption data for the adsorbed amount $v$ (STP cm$^3$) can be analyzed by fitting to two different relationships, one of which gives a straight-line presentation.
   (a) Give the quantities "$y$" to be taken as dependent variable in each of these fits.
   (b) Assuming the measured $v$s have constant uncertainty, how should the data in each of these two fits be weighted?
   (c) If these data have proportional uncertainty ($\sigma_v \propto v$), how should the data be weighted in each case?