ChE 2300 HW1
Due Friday August 28, 2020 at 6pm
Submit as a single .pdf file in Canvas

To ensure that you receive full credit for your solutions, write out all equations in symbolic form, give numerical values for all variables and constants in the equations, and write answers to definitions or conceptual problems in complete sentences. Approximate answers are rounded to one significant figure. Your answers need to be reported with three significant figures.

Problem 1 (0.1 points)
If atmospheric pressure is 0.8 bar and the absolute pressure of your tank is 1000 kPa, what would the gauge pressure on your tank read? *Approximate answer: 1000 kPa.*

Problem 2 (0.25 points)
The NFL is concerned about under-inflated footballs. Suppose a ball is initially filled at room temperature (22°C) to the minimum allowable pressure, 90 kPa.

a. If it is then cooled to 10°C, by how much does the pressure change? Report your answer in kPa. You may assume that the atmospheric pressure is 1 atm = 100 kPa and that the volume of the ball is constant. *Approximate answer: 4 kPa.*
b. If the ball were wet what effect might this have?

Problem 3 (0.2 points)
Are the following properties intensive or extensive and why?

Property	**Intensive/Extensive?**	**Why?**
Temperature (K)		
Volume (m^3)		
Specific volume (m^3/kg)		
Enthalpy (kJ)		
Porosity (unitless)		
Specific heat capacity (kJ/kg K)		
Distance (km)		

Problem 4 (0.2 points)
A barometer at the top of the mountain reads 65 kPa while one in the valley reads 101 kPa. Estimate the difference in elevation between the two locations in meters and feet. Assume an average air density of 1.2 kg/m^3. *Approximate answer: 10,000 ft.*

Problem 5 (0.25 points)
Use the ideal gas equation to find the densities (in kg/m^3) of helium (He), nitrogen (N_2) and butane (C_4H_{10}) at pressure P = 1 atm and temperature T = 25°C. Explain why you might be more worried about a butane leak than a helium leak. *Approximate answers: 0.2, 1 and 2 kg/m^3.*