

# Problem Set #2

## Physics 436

Friday, 28 January 2022

The following problems come from Schroeder's *An Introduction to Thermal Physics*:

- Problem 1.20 on page 13 (*10 points*)  $\Rightarrow$  Give the speeds in both m/s and mph.
- Problem 1.23 on page 17 (*10 points*)  $\Rightarrow$  Be sure to read page 16 carefully. It will help you determine the number of degrees of freedom needed for helium and air.
- Problem 1.31 on page 22 (*15 points*)  $\Rightarrow$  You get to compute a bunch of numbers in this problem. Make sure you understand the signs of quantities like work, change in internal energy, and heat.
- Problem 1.36 on page 26 (*15 points*)  $\Rightarrow$  Work part (b) out for the general case before inserting any numbers. You should be able to derive the following very important result:

$$W = \frac{P_f V_f - P_i V_i}{\gamma - 1}.$$

In addition to kelvins, give the part (c) answer in  $^{\circ}\text{C}$  and  $^{\circ}\text{F}$ . After doing so, you might better appreciate Schroeder's footnote on page 24.

- Problem 1.41 on page 31 (*10 points*)  $\Rightarrow$  In this problem, you learn a simple way to determine the heat capacity of an object.

Due date: **Friday, 04 February 2022**