## Practice Problems

1. On the course website you will find links to data compiled by the Lawrence Livermore National Laboratory that tracks energy usage (from source to use) for the United States. Use these links to answer the following questions:
   1. Based on US energy flow for 2021, what is the average conversion efficiency for electrical plants?
   2. For 2021, what is the average conversion efficiency within each sector for: residential, commercial, industrial, and transportation?
   3. Do some analysis on the US energy flow over the last several years. What are two significant changes you see over this time?
   4. What is the unit of a Quad? (Hint: It isn’t related to ATV’s)
2. Get a copy (electronic PDF?) of the textbook. Doing an Internet search for “Balmer Thermodynamics” may help.
3. Order a physical copy of the Thermodynamic Tables to Accompany *Modern Engineering Thermodynamics.* The UI bookstore often has some, or they can be ordered online for cheap (usually under $20). Or talk to a former ME 322 student and offer them $10.

## Preparatory Reading Questions (this part will not be turned in)

The idea behind these questions is to have you use your textbook (or any other appropriate resources) to find answers to these questions. This is usually in preparation for the next lecture. It will be helpful to know which topics you are comfortable with, and which concepts you are most confused about. If you are confused, make sure to mention which topic(s) you’re having trouble with at the start of the next class.

1. For each of the following units expressions determine:
   1. Name of the concept associated with the unit (e.g. Newton [N] 🡪 Force)
   2. Fundamental dimensions of each unit below in terms of   
      mass (M), length (L), time (t), and temperature ()

**Pascal [Pa] ft-lbf slug Joule [J]**

1. For temperature, how do you convert between oF, °R, oC, and K? What is the significance of an absolute unit?
2. What is meant by absolute pressure versus gauge pressure? How do you know if a pressure in English units is absolute or gauge?
3. What is the difference between a mole, a gram mole, and a pound mole?
4. How do you convert between mass and moles of a chemical substance?
5. Why does gc have magnitude and dimensions in the English system but not the SI system? Is gc a universal constant that can be applied anywhere in the universe?