1. Here are four kinds of variable stars:
   (a) Cepheid variables.
   (b) Supernovae.
   (c) RR Lyrae stars.
   (d) Eclipsing binaries.

   For each type, draw a typical light curve and give a one-sentence description of the cause of the variability.

2. Describe the forces of attraction and repulsion between two protons as their separation changes.

3. Austin Energy, the electric utility for the city of Austin, can produce about 3000 MegaWatts of power (as of 2014). Since one Watt is $10^7$ ergs/sec, and a MegaWatt is $10^6$ Watts, Austin Energy can produce

   $$3000 \times 10^6 \times 10^7 = 2.5 \times 10^{16} \text{ erg/sec}.$$ 

   Suppose you could convert mass to electrical energy with 100% efficiency. How much mass would you have to convert to energy every year to satisfy the needs of Austin Energy?

4. After you strike a match, the hot gases in the flame of the match soon disperse. Stars also consists of hot gases. Why do they not disperse? Main sequence stars do not collapse under the force of their own gravity. Why not?