Homework #1
Due at the start of class Feb. 10

For each homework assignment, please write neatly, staple multiple pages, and show your work to receive full credit. You may not receive full credit for simply providing an answer. I encourage you to work with others on problems, but written up solutions must be your own. Office hours and help sessions are available if you are having trouble with a problem. Remember to round your answers and include the appropriate units.

1. The following important terms will be used throughout the course. First, write down what the term means to you or how you’ve heard it before. Then look up the words in your textbook’s glossary and give their astronomical definitions, if different. Optional: Draw a picture of each!
   (a) planet
   (b) moon
   (c) star
   (d) solar system
   (e) galaxy
   (f) black hole
   (g) comet
   (h) universe
   (i) lightyear

2. From lecture, we found out that a typical galaxy contains about 100 billion stars. Astronomers now estimate that there are about as many galaxies in the Universe as there are stars in a galaxy. How many stars are there in the entire Universe? This number is about equal to all the grains of sand on all the beaches on Earth!

3. If a skydiver jumps from a plane at a sufficient altitude, the skydiver will eventually reach a terminal speed of about 120 miles per hour before reaching the ground. Convert this speed into meters per second (m/s). Use the conversion factor 1 km = 0.6 miles.

4. It takes light about 8.3 minutes to travel from the Sun’s surface to the Earth. How long would it take an airplane traveling at the speed of sound in air (340 m/s) to make the same trip? The speed of light is $3 \times 10^8$ m/s. Hint: you don’t actually need to know the distance between the Earth and Sun. Provide an example of something as old as the time you found.

5. What is the celestial sphere, and why is this ancient concept still useful today?

6. In a paragraph, explain why we have seasons on Earth. Be sure to include a diagram.

7. How many constellations are there? Does every star belong to one? How many constellations does the Sun move through in a day? in a year?