Spring 2019

ASTRONOMY 330
Homework #1
DUE IN CLASS Thursday, 2/28

You will need a calculator to do some of these problems (similar to some you'll see on the exams). **Don't forget that you have on-line resources you can consult on the "Links" page.** ***REMINDER:*** Though you may work together on homework, what you hand in must be in your own words. Be sure to include the names of others you worked with. Write on **one** side of the paper only, and leave room at the margins and between problems for comments and corrections.

1. If a certain star appears 10^4 times fainter than it would be at a distance of 10 parsecs, how far away is it, in parsecs?

2. a) The smallest parallax that can be measured with ground-based telescopes is about 0.03 arcsec – how far away, in parsecs, is a star with this parallax?

   b) The European Space Agency's *GAIA* satellite has mapped 1 billion stars in our Milky Way Galaxy. As we saw in class, *GAIA* will measure parallaxes down to 10^{-4} arcsec. How far away, in parsecs, is a star with this parallax?

   c) Compare the *volume* of space that can be sampled by *GAIA* compared with what can be sampled using ground-based telescopes. (*HINT:* Volume scales as distance^3.)

3. If the luminosity of an object used as a standard candle (like a Cepheid variable) were discovered to actually be twice as great as originally thought, what would astronomers have to do in order to correct distances that were derived using the original (erroneous) luminosity?

4. For each of the following blackbody temperatures, calculate the wavelength of the peak emission and say in what part of the electromagnetic spectrum that wavelength falls:

   a) 30,000 K
   b) 3,000 K
   c) 30 K
   d) 3 K

   Express your answers in appropriate units; it will be useful to remember that:
   1 Å = 10^{-10} m; 1 nm = 10 Å = 10^{-9} m; 1 μm = 10^4 Å = 10^{-3} mm.