Astronomy 301 – Fall 2019

Homework 4

Due Date: Wednesday, October 2, 2019, 9:00 AM

You must turn in your homework answers electronically via Canvas. A .pdf or .docx file would be best, but if you can get a good image of your hand-written homework, a .jpg or .png file would okay also. Make sure your name and eid appear at the beginning of your homework.

We encourage you to work together on the homework but you are not allowed to copy from each other. You must write out the answers in your own words.

1. Temperature measures a property of atoms and molecules. What property? Suppose you put an ice cube in a warm empty cup. Before long the ice warms up and melts, and the cup cools to a lower temperature. What has happened to the molecules in the cup? Why?

2. The star Rigel has a temperature of 11,500 K. What is the wavelength (in Ångstroms) at which it emits the most flux in its spectrum? The peak flux in the spectrum of a neutron star is emitted at a wavelength of 40 Å. What is the temperature of the neutron star?

3. Two stars, A and B, have the same temperature, but their luminosities are 9.0 and 0.25 times the luminosity of the sun respectively. What is the ratio of the surface areas of the two stars? What is the ratio of their radii?

4. Calculate the energy of a photon of light that has a wavelength of 5000 Ångstroms. The luminosity of the sun is 4×10^{33} ergs/sec. How many photons per second are emitted by the sun (assuming for simplicity that all the sun's photons have the same 5000 Ångstrom wavelength)?