Homework Assignment 2
Due: Sep. 13

Problem 1 (20 Points)
Assume that the Sun radiates as a blackbody at T=5783 K and is a uniform sphere with a radius of 6.96x10^5 km. Calculate the broadband radiance and irradiance at the orbits of Venus and Earth. The distance between the Earth and Sun is 1.5x10^8 km and between the Sun and Venus is 1.08x10^8 km.

Problem 2 (10 Points)
The net flux is defined as the integral of a normal component of the intensity over the all solid angles (over 4π). Starting with this definition, show that \( F_{\text{net}, \lambda} = F_{\lambda} \uparrow - F_{\lambda} \downarrow \).

Problem 3 (10 points)
Show that for isotropic radiation, the monochromatic flux is \( F_{\lambda} = \pi I_{\lambda} \).

Problem 4 (30 points)
1) Calculate the solar zenith angle in Atlanta at 3:00 pm on September 1. Assume that the orbit is circular.
2) Calculate the day length in Atlanta on September 1.
3) Calculate the daily averaged top-of-the-atmosphere solar flux on September 1 in Atlanta.

Hint: see chapter 2.2 in L02