

UCF Physics: AST 6165 Planetary Atmospheres
Spring 2020 Homework 5, DUE Thursday, 13 February 2020

Reading for this assignment: Andrews, sections 3 – 3.2.

Problems:

1. (4×10 points) Andrews 3.2
2. Assume the sun to be a blackbody of $T = 5800$ K and the Earth to be a blackbody at $T = 255$ K.
 - (a) (10 points) Calculate the total emitted radiation from each body *vs.* wavelength. Plot these on linear-linear and log-log scales, with the two plots each containing both spectra. You may multiply the Earth's spectrum by some factor to make it visible in the linear-linear plot, but not on the log-log plot. Draw vertical lines at 0.4, 0.7, and 4 μm .
 - (b) (10 points) Tabulate the fraction of emitted energy for both spectra in each of the ranges 0 – 0.4 μm (γ -ray, x-ray, UV), 0.4 – 0.7 μm (visible), 0.7 – 4 μm (near IR), 4 – ∞ μm (mid- and far IR, submillimeter, and radio). You may use numerical integration. You may tabulate the fractions right on the plots in the regions given, or just put them in a separate table with columns for the wavelength range, sun, and Earth.