Homework #1
Due Friday Aug 22

Homework is due by 5:00 pm on the due date. Late homework will not be accepted.

1. LeBlanc 1.1 (You can use an integral table or Mathematica or Python to find that final value of the integral which should be in dimensionless form).
2. LeBlanc 1.3
3. LeBlanc 1.4
4. LeBlanc 1.5
5. We showed in class that $A_V = R_V\, E_{B-V}$, where for standard Galactic dust $R_V = 3.1$ What is the relationship between A_B and E_{B-V}, i.e. what is the value of R_B?
6. LeBlanc 1.2. You will obtain a trancendental equation that you may solve either graphically or by the use of bisection, which should only takes about 7 iterations. You can do bisection in an Excel spreadsheet, with a calculator, with Mathematica, Python, Fortran, C, or C++.
7. As we discussed in class the Planck function can be written as

$$B_\nu = \frac{2h\nu^3}{c^2}\frac{1}{\exp h\nu/kT - 1}$$

$$B_\lambda = \frac{2hc^2}{\lambda^5}\frac{1}{\exp hc/(\lambda kT) - 1}$$

   (a) Starting from B_ν, derive B_λ.

   (b) For $T = 5000$ K, plot B_ν and B_λ vs λ on the same plot. You will have to scale B_λ by a large factor to be able to plot them. Indicate the value of $\lambda_{\rm max}$ for each of them. Explain why they are the same or different.

   (c) Calculate the $\lambda_{\rm max}$ for B_ν and B_λ.

   (d) Which is the one used in the traditional Wien displacement law?