Astro 500 Problem Set #1

Use definitions and numbers given in the class notes.

1) What is the difference between the *J* magnitude of a source in the Johnson and AB systems?

2) What is the *g*'-*J* color (AB) of a source with a spectrum that is flat (constant) in f_λ ?

(Hint: Start by defining the relation between f_λ and f_ν.)

3) What is the effective spectral index α of the F6 subdwarf BD +17°4708 between *B* and *V* bands, such that $f_\nu \propto \nu^\alpha$? What is the corresponding *B*-*V* color in the AB system?

4) Calculate the number of photons per second per arcsec^2 incident at the top of the atmosphere on a 6 inch lens for a source with μ_V=29 mag arcsec^{-2}. This is equivalent to the faintest surface-brightness levels currently detectable.

5) Estimate the equivalent number of solar-mass stars parsec^{-2} for μ_V=29 mag arcsec^{-2}.