Homework 4

Magnitudes

1 Two objects from the SDSS survey have g=17 and g=19.5, respectively. Which is brighter, and by how much?

The difference in magnitude between the two stars is 2.5, which corresponds to a brightness difference of a factor of 10, using the relationship

$$m_1 - m_2 = -2.5 \log \left(\frac{b_1}{b_2} \right)$$

Since objects with numerically higher magnitude values are fainter, the object with g=17 is 10 times brighter than the object with g=19.5.

2 Star A has V=12, star B has V=14.5. Which is brighter, and by how much?

Using the same reasoning as in question 1, star A is 10 times brighter than star B.

3 A star has B-V=0. What does that imply about the slope of its spectrum? Is the slope independent of whether F_ν or F_λ is being plotted? If not, how do they differ?

If B-V=0, then B=V. In other words, the magnitude in the 'blue' part of the spectrum is the same as the magnitude in the 'green', or visual part of the spectrum. Since the UBV system is a wide band photometric system, B and V both cover a relatively wide range of wavelengths, so while the F_λ spectrum may be flat, the F_ν won't necessarily be.