Astronomy 253, Spring 2004
Problem Set 2

Due Friday, February 20

Those problems marked "[**solo**]" you must do on your own, without talking to anybody else other than the instructor. On all other problems, you may discuss the problems with anybody, though of course the final solution you present must be your own.

1. *Sparke & Gallagher*, problem 5.7.

2. [**solo**] *Sparke & Gallagher*, problem 6.2. Also answer the following: once you are looking far enough from the center of the galaxy the surface brightness of the galaxy has dropped below the surface brightness of the sky, is it still possible to observe the galaxy?

3. Look at table 1.6. Does it surprise you that sky brightness in bluer light (B and V filters) is more affected by the presence of the moon than sky brightness in redder light (R, I, infrared filters)? What everyday observation might have led you to predict this, and what the heck does the moon have to do with it? Explain.

4. *Sparke & Gallagher*, problem 6.3. This one will require some of the same difficult magnitude and surface-brightness wrangling you had to do in the group problems last Friday.

5. [**solo**] Take what the text says about the color, metallicity, gas, and star formation rates of elliptical and spiral galaxies. In a few sentences, predict what differences in the colors, gas fractions, and star formation rates you might expect to see for very distant elliptical and spiral galaxies. Note that if you look at things very far away, you're looking back in time; the farther away something is, the longer it takes the light to reach you. (This is how astronomers probe the "early universe", but looking at very distant objects.) For purposes of this problem, make the (incorrect) assumption that galaxies never merge. If you know what redshift is, assume that you've successfully corrected for it (so there will be no color-change effects due to redshift).

6. **Extra Credit** (not required, worth 1/2 of a regular problem). *Sparke & Gallagher*, problem 6.6. Notice that it continues on page 243!