

**Astronomy 190 A – Discovery Seminar, Early Fall Start 2006**  
**Exam 1 – Due at the start of class, Wednesday, August 30, 2006**

Pick any two of the following three topics for your exam. Answer the questions posed, but do so in narrative form, explaining the details in your own words. You may mix up the answers to the questions within each topic in order to make your essay reflect your understanding and to follow the logic you choose. Your writing should be geared towards another student in the class, one that is theoretically familiar with the terminology and overall content of what we have covered.

Please type your essays. Guidelines: Each essay should be no longer than one page. Use 10 – 12 pt font (something like Arial or Times New Roman, or something similar, for consistency), 1” margins, single-spaced paragraphs are okay, but please double space between paragraphs. If you want to submit your document as an attachment via email, that would be great!  
larson@astro.washington.edu

The essays will be graded on completeness and correctness, 25 points each.

### 1. The Celestial Sphere

Summarize the basic features of how the celestial sphere is used in astronomy. Discuss why the celestial sphere “rotates” over a day, and why we see different constellations during the year. Why is the solar day longer than the sidereal day? What are the celestial equator, ecliptic, and celestial poles? What is meant by a circumpolar constellation, and why doesn’t Polaris ever set from the northern hemisphere? How do astronomers define a constellation today? How do astronomers use the equatorial coordinate system (right ascension and declination)?

### 2. Telescopes

Summarize how telescopes are used in astronomy, especially at the level at which we are working—the amateur astronomer. What is the most important feature of a telescope? What’s the difference between a refracting and a reflecting telescope, and which kind is preferable these days? Why is resolution important? Why would a two-meter telescope have better resolution than our 0.3-meter (12-inch) telescope? Why do telescopes need to have a good, dependable motorized drive system? What do ground-based telescopes have to deal with that space-based telescopes (satellites) do not?

### 3. Digital Detectors: the Charged-Coupled Device

You all got fairly intimate with the SBIG 8XE digital camera and the CCD it contains during our observing nights. The CCD has revolutionized not only professional but also amateur astronomy; however, working with it is very different from taking an image with an everyday digital camera. Explain basically how the astronomical digital camera works. Why must the CCD be cooled to very low temperatures? Why must we take good flatfields and dark frames? What are the guidelines for getting a good flatfield? How do we get the information from the CCD after our exposure to the computer? Why are longer exposures better? What limited the exposure time at our telescope, and why?