AST 312
Laboratory Assignment Number 1
Due Tuesday January 14, 2003

Observing the real night sky

On a clear evening (something not always easy to come by in Michigan at this time of year), examine the night sky with the naked eye. You may want to use the Abrams Planetarium sky map and Starry Night as an aid in identifying objects. By the end of the course you will be expected to be able to identify the following objects:

Stars	***Constellations***	***Other***
Aldeberan	Cassioia	Great Square (Pegasus)
Rigel	Taurus	Winter Hexagon
Betelgeuse	Orion	Pleiades
Capella	Leo	Orion Nebula
Sirius	Big Dipper (Ursa Major)	Summer Triangle
Castor	Little Dipper (Ursa Minor)	Jupiter
Pollux	Scorpius	
Procyon	Cygnus	
Regulus		
Arcturus		
Spica		
Polaris		
Antares		
Vega		
Altair		
Deneb		

Try to find which of these objects are visible from Lansing at this time of year. As the course progresses, we will be identifying additional objects, either in the real sky or by aid of the planetarium. With the naked eye, we can make three sorts of observations of the stars: (i) positions, (ii) brightnesses, and (iii) colors.

1. Find Orion. Identify the bright stars Rigel and Betelgeuse. Describe the colors of those two stars as they appear to you.

2. (a) If you extend your arm, your fist will subtend an angle of about 10 degrees or a little less. You can determine this more precisely for your own arm. Measure the distance across your fist. Hold your arm out, and measure the distance from your eye to your fist. Use simple trigonometry to calculate the angular size of your fist when it is held at arm's length in front of your eye.

(b) Now, with your calibrated fist, measure the apparent angular size of the Belt of Orion. The Belt consists of the three comparably bright stars across the middle of the constellation. About how accurate do you think your measurement is?

3. The first measurements of the brightnesses of stars were made with the naked eye. Here we will use two stars of known magnitude to estimate the brightness of a third star. Because the air through which we observe the stars dims their light, to do this exercise you may wish to wait until the constellations involved have moved away from the horizon, where the atmospheric dimming is greatest. Find the stars Castor and Pollux in the constellation Gemini. Then find the bright star Capella in the constellation Auriga. The apparent visual magnitude of Capella is about 0.0. The apparent visual magnitude of Castor is about +1.6. Remember that magnitudes are larger for fainter stars. Use these two comparison stars to estimate the visual magnitude of Pollux. How accurate do you think your estimate is?

Using the Starry Night software

Install your copy of Starry Night and check that it is operating correctly.

4. Set your home coordinates for East Lansing (latitude = 42 degrees 40 minutes, longitude = 84.2 degrees west of Greenwich). Set the time for the current date and find the constellation Orion in the evening sky. You can use Starry Night to measure the angular separation of stars (see Angular Separation in the Manual). Measure the angular separation between the two end stars of the Belt of Orion. How does your result compare with that which you found using your fist as a measuring scale? You should do your naked eye estimate first, so that the Starry Night result does not bias your answer.

5. Starry Night can also be used to obtain information about particular stars. Using Starry Night, find the star Pollux. Point the cursor at the star and right click to bring up the information menu. Left click on the info window to obtain data on Pollux. What is the listed apparent magnitude for Rigel? How does that value compare with your estimate? Again, you should do your naked eye observation first, so that the Starry Night result does not bias your own observation.

6. (a) Starry Night lets you see when particular stars rise and set. Starry Night lets you turn off “daylight” using the menu under the “Go” command, so that you will be able to see stars which rise or set during the daylight hours as well as those which rise or set after nightfall. Determine the approximate time at which the following stars rise above the horizon and set below the horizon: (i) Sirius and (ii) Aldeberan.

(b) Some stars never set as seen from East Lansing. They are called circumpolar stars, and as the earth spins on its axis, they appear to circle the north celestial pole in the sky but never dip below the horizon. Use Starry Night to determine whether the following stars are circumpolar: (i) Capella in Auriga and (ii) Dubhe in the Big Dipper.