

Due: Thursday, September 11

Text Reference: Chapters 1, 2 and 3

Purpose: In astronomy today, computers are used to control telescopes and instruments, to view images from detectors, and to processes and analyze the images. We will be using a number of programs in this course, including *The Sky* to control the telescope, *CCD Ops* and locally written programs to operate the CCD cameras, and *IDL* for imaging processing and analysis. This lab introduces you to *The Sky*.

Procedure: Carry out the following steps on one of the computers in Serin 401. Prepare a report that answers all of the questions below. Your report should also document the date and time that you carried out these exercises. Each student should work independently on this assignment.

- 1) Log into one of the computers in room 401, using your RUCS id as user name and the last 4 digits of your student ID number as password. Be sure to use OBSASTRO in the "Log on to:" box, and not the name of the local machine. If this is your first use of the observing network, you can and should change your password to something more secure after you log in. If you forget your password, contact Dr. Williams to have it reset.
 - 2) Start *The Sky* by clicking on the icon on the desktop. Explore the options on the menus and the buttons on the toolbars (note that if you leave the mouse stationary over a button for a short time, a tooltip describing the button will pop up). Pull down the *View* menu, and click on *Status Bar*; Select the *Date* and *Time* fields in *Other Options* and click on *OK* – this will display the date and time on the status bar at the bottom of *The Sky*'s window. Pull down the *Data* menu, and click on *Site Information*. On the *Location* tab, select the Schommer Observatory. On the *Date and Time* tab, unclick the *Use Computer's Clock* item. Set the date to September 11, 2008, and the time to 19:15:00 (7:15 pm). The click the *Apply* button, and then the *Close* button. Note that the sky display will adjust to the selected location and time. (After you have completed this assignment, you may want to experiment with different sites and/or dates and times – for example, to see what is happening at the SALT observatory, use the South African Astron. Obs. location from the World Observatories database.)
 - 3) Use the toolbar buttons to experiment with selecting the various display viewpoints, zooming and panning, and displaying the various grids, lines, boundaries, and labels. Note that as you zoom in to greater levels of detail (in smaller fields of view) more objects are displayed. Use the toolbar buttons and the *Filters* item on the *View* menu to turn on and off the various sorts of objects that *The Sky* can display. Vary the Faint Magnitude Limit on the *View/Filters* menu and observe the effect.
- Q1) Identify the symbol that *The Sky* uses for each of the following kinds of objects, sketch the symbol, and give a 1-2 sentence description of your understanding of what that kind of object is: star, planet, comet, open cluster, globular cluster, nebula, planetary nebula, spiral galaxy, lenticular galaxy, and irregular galaxy.
- Q2) What planets are visible from the Schommer Observatory at 7:15 pm on September 11, 2008? List the constellation in which each appears.

- Q3) Use the *Find* tool to locate Sadr. Make sure that the “More Information” mode of the Object Information box is selected. List each item and its value from the Object Information box, and describe the meaning of each entry. (Use an astronomy text or the Web to learn about any quantities that you are unfamiliar with.)
- Q4) Set the time to 9 pm (21:00:00) and adjust the stellar magnitude limits to display only the stars that are brighter than 1.5 magnitude. Make a sketch of the full sky with these stars on it, and label each with its name, magnitude, and spectral type. On a clear night, find these stars in the real sky and note their relative apparent brightness and color. Include the date and time of this visual observation in your report.
- Q5) Adjust the time step to 1 hour and advance the display with the *Step Forward* button. Describe how the appearance of the sky changes. What major solar system objects (excluding comets and asteroids) are visible on September 12, 2008 at 6:15 am, just before sunrise?
- Q6) On what day in 2008 was Jupiter in opposition (i.e. on the meridian at midnight)? Record the equatorial coordinates (RA and Dec) and the geocentric ecliptic coordinates of Jupiter at this time. Advance the display by 4 hours, close the Object Information box, reopen it, and note Jupiter’s equatorial and ecliptic coordinates. Did they change? Comment on Jupiter’s motion.
- Q7) Use the *Find* tool to locate the Pleiades (M45). Adjust the time step to *Sunset* and find the date on which M45 is on the eastern horizon at sunset. Discuss the range of dates for this semester for which this object is observable sometime between sunset and midnight. Comment on the observability of the object during this range.
- Q8) Set the date and time to Noon, January 1, 2008. Turn off the daytime sky mode, turn on stars down to 6th magnitude, and select a time step of 23 h 56m 04 s (one Sidereal Day). Use the *Go Forward* button, and carefully observe the motion of the planet Jupiter with respect to the stars until January 1, 2009. Describe this motion in detail.