

Astronomy 210 Spring 2005

Stardial #1

Due in Class: Friday, Feb. 11

This project will help you get acquainted with the celestial coordinate system, star charts, and the "online observatory" Stardial. Note: your report should be **typed**, except for your sketch in II.2, which can be hand-drawn.

Part I: Celestial Coordinates:

(1) In the textbook, read the discussion in Chapter 1.3 on celestial coordinates. Briefly explain the equatorial coordinate system," and the celestial analogies to latitude and longitude on the Earth. What are the differences between the units usually used for right ascension, and those used for declination? How many arc seconds are in one second of right ascension?

(2) What are the sun's equatorial coordinates on the day of the spring (vernal) equinox? On the winter solstice?

(3) Find the celestial coordinates of the Orion Nebula (also known as M42, the 42nd object in the Messier Catalog) and the star Betelgeuse, both in the constellation Orion. Note: there are many ways to find these coordinates. The easiest way is probably to go to the Digitized Sky Survey website (the link can be found from the class links page). From there, follow the sidebar link "Search & Retrieval" to "Simple Retrieval Form," and simply type the name of the object and click on "Get Coordinates." Click on "Retrieve Image" (choose gif file format) and you can look at it too! (Try 60 arcminutes too).

(4) What time of year can we observe Orion at night? Show how you can answer this question given the coordinates of Orion.

Part II: Stardial:

(1) Surf the Stardial website (find the link from the class links page). Find out how it works, and briefly summarize your findings. Be sure to mention how the images are taken, how "star trails" are prevented, and what kind of a detector is used.

(2) Where in the sky is Stardial pointed? What region of the celestial sphere (i.e., which celestial coordinates) can you observe with Stardial over the course of a year? (Check the "charts" page.) Sketch the observed region.

(3) Which one of the objects in question I.3 above can be observed with Stardial? Why? This is the object you will look at in Part III.

Part III: Observations:

(1) Locate the object from II.3 (above) in a chart. To do this, either look at the chart corresponding to the object's coordinates on Stardial's chart archive and print it out, or find it another way. Circle the object on the chart, and attach this to your report.

(2) Now go to Stardial's web-based archive, find pictures of the region of the sky you are looking for, and look at the most recent clear night (if the other stars look very different in another image, that means it was not a clear night). Compare with the chart (pay attention to orientation, see the link in "What is Stardial") and locate the object you are looking for. Print out the picture, mark the date of when the picture was taken, and attach to your report.

(3) Repeat part (2) for a different clear night. Does the object look different? Comment on the observed variability (time-dependence) of the observed light from this object. We will later see what this object is, and discuss the implications of your finding.