When you do a calculation, show all your steps. Do not just give an answer. You may work with others, but the work you submit should be your own. I expect numeric answers to have a reasonable number of significant figures and correct units.

1.1 (a) Say, in words, what an astronomical unit is.
(b) Say, in words, what a light-year is.

1.2 (a) What is meant by the phrase "angular diameter"?
(b) If you change your distance from an object by moving 4 times farther away, what happens to the angular size? [Don't just say: "it gets bigger," or "it gets smaller." Be specific: “it is 5 times larger” or “it is half as large” or …]

1.3 (a) What is the ecliptic?
(b) Where on the celestial sphere would the planets appear? or where in the sky would you look for the planets?


---------- III. Horizon Coordinates ----------

**Question 1**: Complete the following table involving the horizon coordinate system. You should predict the answers and then use the simulator to check them. Remember that you can measure coordinates by dragging the active star to that location.

<table>
<thead>
<tr>
<th>Description</th>
<th>Latitude</th>
<th>Azimuth</th>
<th>Altitude</th>
</tr>
</thead>
<tbody>
<tr>
<td>West point of the horizon</td>
<td>Any</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zenith</td>
<td>Any</td>
<td>Any</td>
<td></td>
</tr>
<tr>
<td>NCP = north celestial pole</td>
<td>30˚N</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NCP</td>
<td>71˚N</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SCP = south celestial pole</td>
<td>52˚S</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SCP</td>
<td>Tropic of Capricorn</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intersection of CE (= celestial equator) and Meridian</td>
<td>40˚N</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intersection of CE and Meridian</td>
<td>0˚</td>
<td>35˚</td>
<td></td>
</tr>
</tbody>
</table>

**Question 2**: The 3rd page contains a diagram known as a “fish-eye” view of the sky. Note that it is drawn like a sky-chart which is held up above your head and mimics the sky in that perspective. You should convince yourself that the east and west directions are shown correctly.

Assume that you are at a northern mid-latitude of 40˚ N. Create stars at (approximately) the specified azimuths and altitudes. You will then be asked to make predictions about the locations and motions of the stars as time advances. After drawing in your predictions you should use the simulator to check your answer. If your original prediction was in error, redraw your star paths to
reflect the correct motion.

(a) Draw in the location of the North Celestial Pole. Note that since this location is directly above the Earth's North Pole it will not move in the sky as Earth rotates.

(b) Draw in star A at the specified coordinates and assume that this is time $t = 0$ hrs.

What will be the coordinates of star A at $t = 6$ hours? _______________________

At $t = 12$ hours? ________________________________

At $t = 24$ hours? ________________________________

**Draw in each of these locations and connect the path between the stars.**

For what fraction of the day is star A visible? ____________________________

(c) Draw in B at the specified coordinates and assume that this is time $t = 0$ hrs. What will be the location of star B at $t = 3$ hours? ________________________________

At $t = 6$ hours? ________________________________

At $t = 12$ hours? ________________________________

**Draw in each of these locations and connect the path between the stars.**

For what fraction of the day is star B visible? ____________________________

(d) Draw in C at the specified coordinates (as best you can) and assume that this is time $t = 0$ hrs. Estimate the coordinates of the star at $t = 6$ hours? ________________

At $t = 12$ hours? ________________________________

At $t = 24$ hours? ________________________________

For what fraction of the day is star C visible? ____________________________

**Question 3 [extra credit]**: Think about the characteristics of a star that passes through your zenith point (still at $40^\circ$ N lat.). Use the simulator to determine the following characteristics of this star.

Rising Azimuth = ______________________

Setting Azimuth = ______________________

Declination = ______________________
Question 4 Comment on how easy/hard the applet was to use. Did it help you understand star motions? Were the other activities we did more helpful? Less helpful?
1.5 Go to [http://www.youtube.com/watch?v=17jymDn0W6U](http://www.youtube.com/watch?v=17jymDn0W6U) and watch the movie like “The Known Universe” by the American Museum of Natural History that was made from actual images of the sky and/or actual measurements of objects and their locations which were recreated to scale.

(a) How does it compare to the one that we saw in class [Powers of 10]? More/less helpful? more/less interesting? etc.?

(b) At about what distance does the Sun appear as just another star? Note: you will have to estimate between 2 given “time” values. [Consider how to convert the time given to a distance!]

(c) At about what distance do the background stars appear to shift positions significantly?