You can review some concepts of the Celestial Sphere by reading the notes online. Refer to the two star maps that were handed out in class for some of the questions below.

Answer the following questions in the space provided.

1) Label the coordinates on the star maps in hours of Right Ascension and degrees of Declination. $0^h$ of RA begins at the rightmost edge of the maps. What constellation is at RA $\sim 0^h$ and Dec $\sim 0$ degrees.

2) What is the ecliptic?

3) In the space below, draw a celestial sphere with the North Celestial Pole, the celestial equator, the ecliptic, the vernal equinox, the autumnal equinox, the summer solstice, and the winter solstice all labeled.
4) If you were standing on the Earth’s equator, where would you look to see the North Celestial Pole?

5) Below is the location of the Earth and the Sun at the summer solstice. Show the place on Earth where the Sun is directly overhead at noon. What is the latitude of this location?

6) How high in altitude above the horizon is the North Celestial Pole when viewed from the following locations:
   a) The North Pole
   b) The equator
   c) Athens, GA (latitude 34 degrees North)
7) At a latitude of 60 degrees North, how high is the Sun above the horizon at noon on the day of the summer solstice?

Hint: At what latitude is the Sun overhead on that particular day (see problem 5).

8) Look at the two star charts that were handed out in class. The horizontal axis is the celestial longitude or Right Ascension. The units of measurement, instead of being in degrees, arcminutes, and arcseconds (like the declination) are in hours, minutes, and seconds of time. The conversion is easy if you remember that 360 degrees = 24$^\text{h}$ or 15 degrees = 1$^\text{h}$. Also, recall that one degree is made up of 60 arcminutes and 1 arcminute = 60 arcseconds.

Convert the following Right Ascension from h, m, and s of time to decimal degrees.

a) 4$^\text{h}$ 20$^\text{m}$ 30$^\text{s}$

b) 3$^\text{h}$ 00$^\text{m}$ 00$^\text{s}$

c) 17$^\text{h}$ 12$^\text{m}$ 49$^\text{s}$

d) 21$^\text{h}$ 00$^\text{m}$ 15$^\text{s}$
9) Go to either of the two star charts and find the 2 points where the ecliptic (marked as a dashed line) crosses the celestial equator. What constellations are these 2 points located in?

10) This winter and early spring the part of the sky that is visible in the early evening is between 3$^h$ and 11$^h$ RA. List 5 first magnitude stars on these charts. Find 1 first magnitude star in the same RA range which is not visible from Athens, GA? Why is this star not visible from Athens, GA?

11) What is the blue-tinted region running through the charts? Why can’t you see this feature from Athens, GA?

12) Find 3 deep sky objects from the Caldwell Objects star chart (clusters, galaxies, or nebulae) on the charts and list their approximate RA and Dec.
13) List all the constellations in charts that the ecliptic passes through.

14) List all the constellations on charts that the celestial equator passes through.

15) Go to the Messier star chart. Look at the region around 12\(^{h}\) 30\(^{m}\) and 12\(^{\circ}\). What is odd about that region?

16) Go to the Messier chart. Look at the region around 4\(^{h}\) 30\(^{m}\) and 17\(^{\circ}\). This is the Hyades Open Cluster (of stars). Find another Open Cluster nearby. Give its name and appropriate position.