1. **Parallax.** You are out on the plains east of Denver at twilight. There is a mountain in the distance, and Venus is visible just above the mountain. You want to measure the distance to the mountain using your naked eye and rulers.
    a. (10 pts.) Describe how you could measure the distance to the mountain without going up to the mountain. Draw picture(s) of what you would see. On another drawing viewed from high above you and the mountain, show the key items in your description.
    b. (5 pts.) Make up a plausible numerical example of your method. Show numerical values of the parallactic shift between observing stations for a mountain one km away and for mountain 10 km away. In other words, for the baseline that you chose, compute the parallactic shift for these two distances. Recall that a parallactic shift of 0.0016 radians (1mm at arm's length) is not easy to measure.
    c. (5 pts. bonus) If the measurements for your method take less than one minute to do, you get a 5-point bonus. You must estimate the time needed to make the measurements.
2. **The distance to star A** is 3.4 pc, and its coordinates are 21 hr + 0°. The distance to star B is 300 pc, and its coordinates are 21 hr + 0°. For this problem, assume the orbit of the earth is along the celestial equator.
    a. (5 pts.) Draw a picture to show the location of the star and the location of the earth on the solstices.
    b. (5 pts.) On which two dates is the parallactic shift between the two stars zero? On which two dates is the parallactic shift largest?
    c. (5 pts.) Sketch a plot to show how the parallactic shift changes with time over the course of a year.
    d. (5 pts.) How large is the greatest parallactic shift?
3. **Parallactic shift of Polaris**. The star Polaris is very close to the North Pole, and its distance is 3 pc. Its coordinates are 0hr+89°59'59". (These numbers are faked to make the problem easier to visualize.) A much more distant star is at the North Pole. For this problem, assume the orbit of the earth is along the celestial equator.
    a. (5 pts.) Why would Polaris be shifted from its location in the figure?
    b. (5 pts.) Draw Polaris and the more distant star as seen on 21 March and on 21 September.
    c. (5 pts.) Draw Polaris's path over a year.

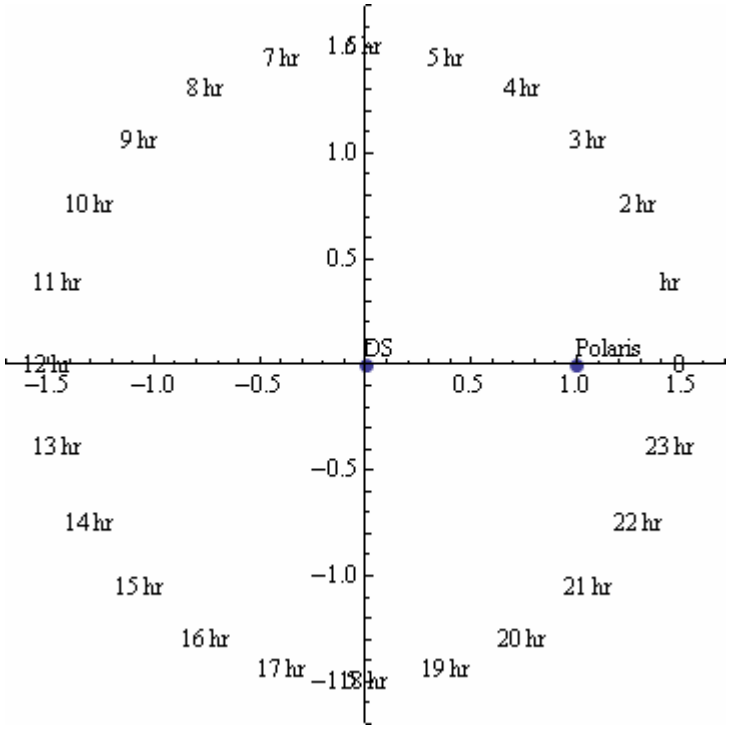

Figure 1 A very distant star and Polaris had its distance been very great also. The scale is seconds (1/3600°).