Homework 2
Due Wednesday, September 13

1. In your own words, describe the path of the sun across the sky, as viewed from Utah, in late March or late September (at the “equinox”).

2. Recall that the angle between the northern horizon and the north celestial pole is equal to your latitude, about 41 degrees in Ogden, Utah. At the equinox, the position of the sun in our sky lies on the “celestial equator,” an imaginary circle in the sky that is directly above earth’s equator. Suppose that you are viewing the sun at its highest point in the sky at the equinox. What is the angle between the sun and your horizon? Explain your answer with a sketch.

3. Describe the path of the sun across the sky, as viewed from Utah, in late June (at the summer solstice), and in late December (at the winter solstice).

4. Why is it hotter in summer than in winter?
5. Now imagine traveling to the equator, say Singapore. How is the sun’s path through your sky different from in Utah?

6. Now imagine traveling to the southern hemisphere, say Australia. How is the sun’s path through your sky different from in Utah? (Remember that the seasons are reversed: the southern summer is in December through March, etc.)

7. Your calendar says that the phase of the moon is “first quarter,” meaning that the moon appears half full, and will be full in about a week. The time of day is 2:00 p.m. Is the moon in the sky at this time? If so, where? If not, when and where will it rise? Explain your reasoning.

8. Suppose that, on a particular night, the moon rises at midnight. At approximately what time will the moon rise the following night?
9. Explain how we can tell that the moon shines by reflected sunlight.

10. Explain how we can tell that the moon is closer to us than the sun is.


12. When it is closest to earth, the planet Venus subtends an angle of approximately one minute of arc, or 1/60 of a degree. (Such small angles can be measured only with a telescope. Galileo was the first to make important telescopic observations of Venus.) Suppose that, for lack of a better hypothesis, we guess that Venus is the same size as earth. (By coincidence, this guess turns out to be approximately true.) In this case, what would be the distance to Venus, when it is at its closest? Please answer this question by doing a “big circle” calculation, showing your diagram and your arithmetic on the back side of this page. The trick is to imagine a big circle, centered on earth, passing through Venus. First calculate how many Venus’s would fit around the circumference of the circle. Express your final answer both in earth diameters and in miles. (The diameter of the earth is 8,000 miles.)