Name _____

Astronomy H161 – An Introduction to Solar System Astronomy
Winter Quarter 2009 – Prof. Gaudi
Homework #1

Part 1: Due Monday, January 12 in class
Part 2: Due Friday, March 13 in class

No late homework will be accepted.

Part 1: Determine the resolution of your eyes in red and green. If you wear glasses, use them in these exercises.

a. Measure the size of your pace *Dpac*e in inches.
   i. Walk 5 paces.
   ii. Use a ruler or yardstick to measure the distance you walked in inches.
   iii. Divide by 5.
   iv. Report your result *Dpac*e in inches.
b. Measure distance *Dre*d at which you can resolve a red traffic signal.
   i. Go to 17th street (campus side).
   ii. Walk west from High Street.
   iii. Turn every so often to look at traffic signal at 17th and High.
   iv. Find the point at which you can just barely tell that the red signal is bigger than a point.
   v. Pace off distance to light. (Do not get run over on High Street.)
   vi. If you walk N paces, the distance in inches is $Dred = N \times Dpace$.
   vii. Report this number.
c. Determine the angular size θ_{red} of the traffic light in arcmin.
   i. Use the fact that the traffic light has a diameter of a = 7 inches.
   ii. Use the formula (from class),

$$\theta_{red} = 3440 \text{ arcmin} \times \frac{a}{D_{red}} = 3440 \text{ arcmin} \times \frac{7 \text{ inches}}{D_{red}}$$

   iii. Report your result.
d. Repeat (b) and (c), above using the green light instead of the red light.
e. The angular size of the Moon is 30 arcmin in diameter. How many times larger is the angular size of the Moon than the angular size of the stoplight, θ_{red}, (the size you can resolve with you eyes)? That is, how much is 30 arcmin/θ_{red} ? When you stare at the Moon, how many times bigger is the Moon itself (in diameter) compared to the smallest "spot"

that you can see on the Moon? Give a number for this ratio. How does this number compare with the ratio 30 arcmin/θ_{red} , that you calculated above?

Part 2: Monitor the positions of several celestial objects

a. **The Sun**: Sketch the appearance of the horizon in the west (or east if you are an early riser). Go out several times during the quarter at the time of sunset (or sunrise) and plot where the Sun appears on the horizon, and write down the time. See if you can notice the change in sunset or sunrise points. Get your first point on this as soon as possible, to give you as long a baseline as possible.
b. **Venus**: Venus will both be visible this winter. Venus will be relatively high in the south-southwestern sky at dusk in January, and then will appear progressively lower in the western dusk sky later in the winter. It is quite bright, by far the brightest object in the sky (except the Sun and Moon). Sketch the position of Venus relative to nearby stars. Do this as often as you can. The weather in Columbus is not likely to cooperate! Note the dates and times of your observations.
c. **Your favorite star**: On a clear night, note the time (to the nearest minute) that a star of your choice is lined up with some landmark (e.g., when the star appears at the edge of a building) and note where you were standing. Repeat this again on a different night (at least 4 nights later), making sure that you stand in the same place. From your observations, work out the time it takes the star to get back to the same place in the sky on successive nights.
d. **The Moon**: Do exercise (2c) except using the Moon, and make the observations on different nights but as close together as the weather allows.