1. Explain with a diagram the orbit of Venus in Ptolemy’s model. If Ptolemy had had a telescope, and could see the phases (shadowing) of Venus, would that have given him any doubts about his model? Explain why or why not.

2. Mars in its path through the sky sometimes loops backwards. Explain in your own words why this happens

(a) using Ptolemy’s model, and

(b) with our present day picture of the Solar System.

3. Here is a picture of a sundial:

The rod is parallel to the Earth’s axis. Describe carefully how the movement of the Sun through the sky shows the time on this sundial—in particular, it must read 12 one hour after it reads 11, right? Are you sure the sun’s moving in the right direction for this thing to work?

4. As we went over in class on Thursday, the chain of transmission of Greek knowledge ultimately to Europe has some surprising links. One was the Nestorians, declared heretic and kicked out of the Roman Empire, from their monastery at Edessa in present day Turkey (not the Edessa in Macedonia). They were welcomed by the Persians and set up shop at Gundishapur (or Jundishapur). Some were later given court appointments by the Arab Muslims in Baghdad. Use Google Earth to find out where these places are, put in place markers, and print off the image. Find the approximate distances from Edessa to Gundishapur to Baghdad, and state the approximate dates of these movements.

5. In class, we went through Pythagoras’ proof that the square root of 2 is irrational. Construct an argument along the same lines to prove the square root of 3 is irrational. Does your argument work for the square root of 4? (Hint: for the root of 2, we concentrated on odd and even numbers, that is, numbers that divided by 2 and numbers that didn’t. What do you think is the corresponding procedure here?)