ASTR 2310 General Astronomy I – Spring 2020, Brotherton

Homework #2, due in class Tuesday February 18, 2020

Instructions: Homework write-ups should be clean and clear. Illegible or hard to understand solutions may not earn credit. In addition to the solution, the steps leading to the solution are also important to earn full credit. You may need to use information from the internet to solve some of the problems, and you should clearly state your sources if you do so. Use appropriate units and significant figures for your solutions (or uncertainties if requested). It is permissible to work in groups, but everyone must hand in their own solutions that they have written themselves.

1. Phases/behavior of the Moon – be sure you got it!

a) If the moon is in first quarter phase, and seen directly overhead, about what time is it?

b) If you see the moon rising at dusk, what phase is it in?

c) Where is the moon in the sky when it is a waning crescent and it is 3pm?

d) If the moon is full, what phase is it in a week later?

e) If the moon rises at 9pm one night, about what time does it rise the next night?

2. Size and Distance to Venus

When Venus is between Earth and the sun, its angular size is 0.0165 degrees. At the same time, beaming a radar pulse at Venus from the Arecibo radio telescope in Puerto Rico, the radio signal returns 280 seconds later. A) What is the distance to Venus in AUs? B) What is the diameter of Venus in kilometers. You must show your work for credit, and not just look up these answers in a table.

3. Orbital Alignments

You can assume circular and co-planar orbits to answer these questions. Give your answer in years to two decimal places.

a) The sun, Venus, and Earth are lined up. How long before all three are lined up again?

b) The sun, Earth, and Mars are lined up. How long before all three are lined up again.

4. Reading carefully?
a) How is it that there could be 5 solar eclipses in one calendar year?
b) What is an ascending node?
c) What is an oblate spheroid?
d) What are the draconic and anomalous periods?
e) What exactly is a libration?