Problem set #1
ASTR340 – Spring 2017

Due: Tuesday, 2/7/17

Please return your solutions typed on paper, except where typing equations or figures etc. would be a mess. Neatness and clarity will help you get maximum credit for your work!

1. Myths and theories

Explain how myths and theories differ. Give *your own* examples as part of your discussion.

2. Scientific method

One of my daughters brought the following description of a science emphasis "enrichment cluster" home from school:

> "Students will engage in active and meaningful science learning using hands on explorations. The inquiry-based science process helps students learn science content, engages students as researchers and scientists, and promotes an understanding of the nature of science. Students will then select a topic, develop a hypothesis, test their theories, and communicate the findings in a final product."

Your assignment is

a) To write a brief note to the teacher who wrote this, explaining what the scientific method really is, how it works, and the problems in the description above. Your note should be tactful and useful for editing a description that goes home to the parents of first-graders.
b) Rewrite the description so it is attractive to students and parents while describing a sensible and accurate way of illustrating scientific methods for first-graders.

Words matter! In part because of the science cluster description, my daughter joined the writing cluster…

3. Galileo's observations

a) Fully explain the reasons that Galileo's observations of Venus ruled out the Ptolemaic model for the Solar System, and the logic behind his conclusion. A drawing will help with your explanation.
b) Galileo also discovered large moons orbiting Jupiter. Although this was a less important observation for establishing that the Earth orbited the Sun, it was still important. Why? Discuss the difference these observations had in discriminating between the geocentric and heliocentric models for the Solar system.

4. Kepler's brother's 3rd law

A little known "fact" I just made up is that Johannes Kepler had a brother, Al Kepler. Sadly, Al was jealous of Kepler's success and proposed an alternative to Kepler's 3rd law. Al's 3rd law was

$$\left(\frac{P}{yr}\right)^3 = \left(\frac{a}{AU}\right)^4$$

Al liked it because *both* of his exponents were larger than Johannes' and it worked nicely for the Earth, where Al lived. Look up data for the planets and use both Johannes' and Al's 3rd laws to make a table showing that, while Al's 3rd law works for the Earth, it fails for the other seven planets, but that Johannes' 3rd works for all eight. Then explain what Johannes' law tells us about the Solar system and the rest of the Universe.

6. Some information

Fill out the attached sheet covering course information and your interests.

Information sheet
ASTR340 – Spring 2017
Prof. Harris

Due: Tuesday, 2/7/17

1. Read the course syllabus
Carefully read the course syllabus at www.elms.umd.edu. Then fill out the following:

I have reviewed the course syllabus and understand the work involved and how my grade will be determined. I have also reviewed the University's policies on absences and academic honesty.

Signed: _____ Date: _____

2. Contact information (optional)
Although the instructor can find your official contact information, it's common that this is not the best way to find you if you forget something in the class, etc. The best way to contact me (email address, phone number, etc) is

_____

3. Interests
In this class I am most interested in learning about...

In this class I would rather not hear about...