

Astronomy 105G  
Lab Review Session 1

In collaboration with your Lab Group members, please answer each of the following questions in writing, and be prepared for one group member to turn the answers in on behalf of the entire group.

1. (M1.6) Suppose that the Earth's rotation axis were not tilted with respect to its revolution axis. In that case, would the weather be different at its poles than at the equator? Please explain how the following would differ with respect to the real Earth at the poles:
  - a. the duration of the day and its variation over the course of a year
  - b. the peak height of the Sun and its variation over the course of a year
  - c. the angle of incident sunlight and its duration over the course of a year
2. (M1.7) Last weekend, in the evening, I saw Sagittarius over the southern horizon. Explain, using a sketch, why I won't see it there in the evening six months from now, and how this relates to our model for the Earth's seasons.
3. (M1.8) I propose that all planets or moons that form at the same distance from the Sun as Jupiter will look like Jupiter. How would I test this hypothesis (please remember that, in Science, "to test" means "to rule out")?
4. (M1.10) The Earth-Sun distance is  $1.5 \times 10^{13}$  cm. The distance to the next star is about  $4 \times 10^{18}$  cm. How many times could you fit the Earth-Sun system between Earth and the next star (no calculators please)?
5. (M1.19) Asteroids are quite cold, yet astronomers have recently found that the one whose impact created Mistasin Lake (Labrador, Canada) heated up the rock there to at least 2643 Kelvin. What physical principle explains where the heat came from, and how did this work? How does this help understand why the Sun was already hot before any nuclear reactions took place in its core?