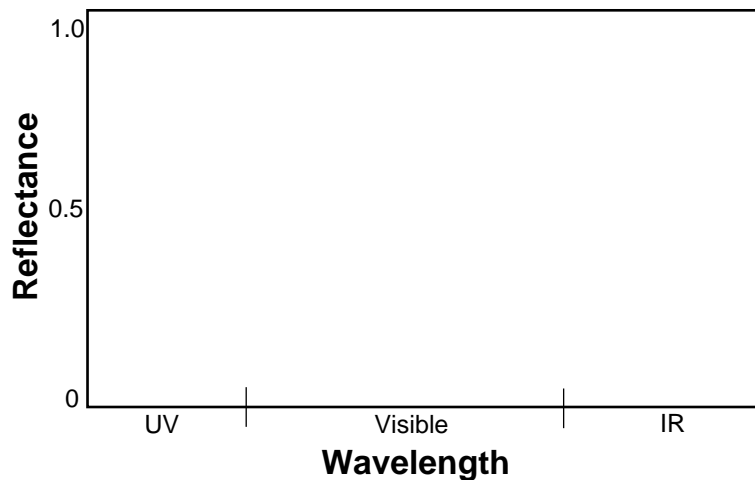
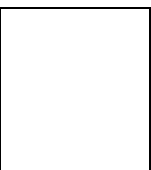


**Answer all questions in the space provided. If you have any questions, raise your hand.
100 points possible. No calculators.**

- 1** (3 pts) Saturn's small moon Mimas is saturated with impact craters. What does it mean to be saturated?
- (a) The addition of more craters would not change the crater density.
 - (b) The addition of more craters will only decrease the crater density.
 - (c) There are no large impact craters.
 - (d) Impacts have released water that has saturated the surface.
 - (e) Volcanic activity has covered most of the craters.
- 2** (8 pts) Explain what I mean when I say that all rocks on the Earth are achondrites.

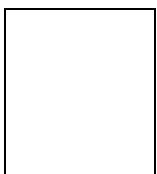


- 3** (5 pts) On the graph on the left, sketch the visible reflectance spectra of a carbonaceous chondrite meteorite.



4 (10 pts) In the space below sketch the **R-Plot** of the crater population of the highlands of the Earth's Moon and the surface of a dead outer solar system satellite (*i.e.* Callisto).

5 (8 pts) The most common type of meteorite to hit the Earth is an ordinary chondrite (74% of all meteorites). Explain why this implies that most of the asteroid in the asteroid belt are far less than 500 km in size.

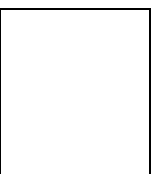


6 (2 pts) Almost all of the regular satellites in our solar system formed by:

- (a) Giant Impact
- (b) Accretion
- (c) Capture
- (d) Fission

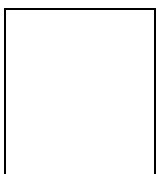
7 (8 pts) I said that inside the Roche Limit of a planet: *“Tidal forces win over gravity”*. Explain what I meant by this statement.

8 (8 pts) Explain why Halley’s comet will **not** be seen in our skies in a million years.



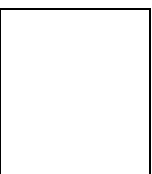
9 (8 pts) Only a few of the outer solar system satellites have atmospheres (Titan, Triton). Explain why this is.

10 (8 pts) Explain why Io would **not** be tidally heated if it had a perfectly circular orbit around Jupiter.



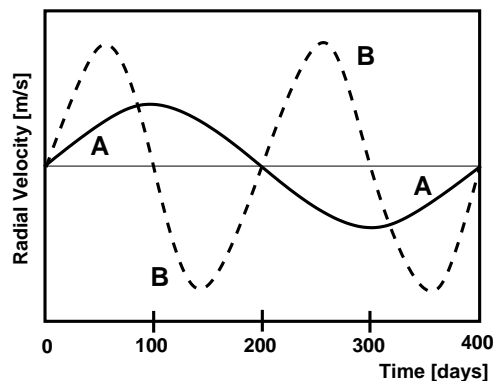
11 (8 pts) Explain why a typical Kuiper belt object would be more primitive than a typical asteroid.

12 (8 pts) Explain why we believe it would be difficult to form Jupiter-sized planets inside the snow-line.



On the right is a plot of the Radial Velocity vs. Time for two different solar-type stars with planets. Assume that the orbits of the planets are circular and that we are viewing the system nearly edge-on.

13 (8 pts) How do the distances of the planets **A** and **B** from their central star compare to the Earth-Sun distance? [Be quantitative, I want some numbers!]



14 (6 pts) Explain why the Hawaiian islands are one of the **worst** places to collect meteorites.

15 (2 pts) And finally, list the top 100 objects in the solar system.

