ASTRONOMY 150 – FINAL Name: _____

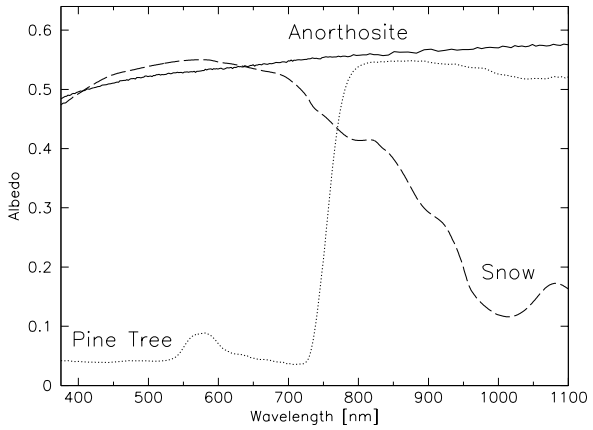
December 12, 2007 – Autumn 2007 TA's Name & Section: _____

Answer all questions in the space provided. If you have any questions, raise your hand. 92 points possible. No calculators or electronic devices of any type.

1 (5 pts) I said that most worlds in our solar system formed by accretion. Explain what accretion is.

2 (5 pts) Explain why accretion is not very efficient within the Roche limit of Saturn.

3 (5 pts) Explain what it means when we say that the orbits of Jupiter's moons Io and Europa are in a 2:1 resonance.



On the left are the reflectance spectra of Anorthosite (solid line), Water Ice [Snow] (dashed line), and a Pine Tree (dotted line).

4 (5 pts) Explain why it would be difficult to distinguish these three samples by observing them only in the visible part of the spectrum (400 - 700 nm).

5 (5 pts) Explain why it would be difficult to distinguish these three samples by observing them only in the infrared part of the spectrum ($>$ 700 nm).

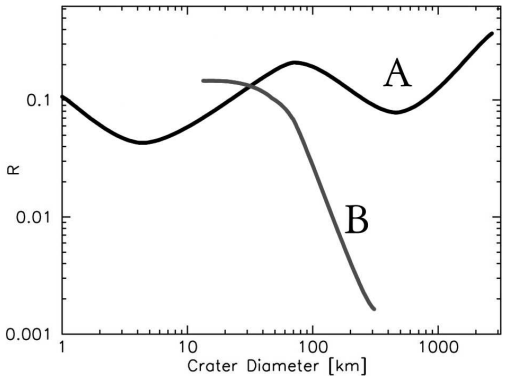
6 (5 pts) Explain why you would **not** expect to find Anorthosite in geologically young regions of the Earth.

7 (4 pts) Compared to worlds in the inner solar system, the worlds in the outer solar system tend to have a:

(a) higher density and a more volatile rich surface
(b) lower density and a more volatile poor surface
(c) higher density and a more volatile poor surface
(d) lower density and a more volatile rich surface

8 (6 pts) Kuiper Belt objects are very hard to observe because they are very small, very far away, and have a very low albedo. Explain how it is possible that we have samples of Kuiper Belt objects and not the much more easily observed moons of Jupiter.

9 (5 pts) Explain why long period comets spend most of their lives without active tails.

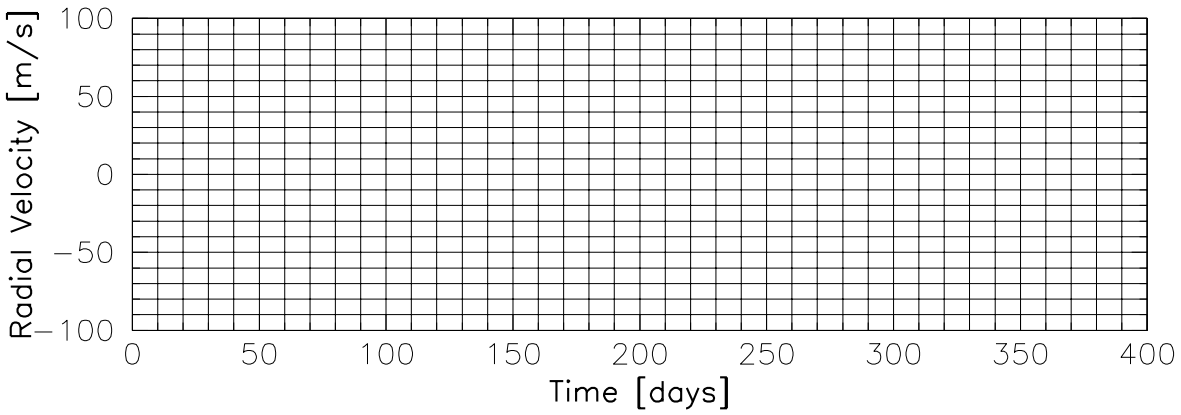


On the left is an R-Plot for the surfaces of two different worlds (**A** and **B**) in our solar system. Assume that both of these world have **no atmosphere** and have very ancient surfaces ($>$ 3.5 billion years old).

10 (5 pts) Describe what the crater population on these two worlds looks like.

11 (5 pts) Explain why surface **A** was likely subject to the late heavy bombardment 3.8 billion years ago, while surface **B** was not.

12 (5 pts) Describe how the R-Plot for surface **A** would be different if world **A** had a thick atmosphere.



Time (days)	RV (m/s)
10	0
30	55
50	80
80	60
110	0
140	-80
200	20

13 (6 pts) The data on the right is for a solar-type star with an unseen 2.7 Jupiter-mass planet orbiting around it. Plot the data on the graph above and determine the period of the of the unseen planet.

P = _____ [days]

14 (3 pts) Is the distance of the unseen planet from the central star greater than or less than 1 AU? Explain your answer.

15 (3 pts) How would the diameter (size) of this 2.7 Jupiter-mass planet compare to the diameter of Jupiter in our solar system.

16 (3 pts) What is the most likely composition of the atmosphere of this 2.7 Jupiter-mass planet.

Assume that you can travel back in time to 3 billion years ago. For each of the three worlds below, describe how the surfaces of the world would differ from the surfaces we see today.

17 (5 pts) Io

18 (5 pts) A Carbonaceous Chondrite Parent Body

19 (5 pts) Earth's Moon

20 (2 pts) And finally, list the top 100 objects in the solar system.