ASTRONOMY 150 – FINAL Name: _____

June 11, 2003 – Spring 2003 TA's Name & Section: _____

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

1 (3 pts) How do you get a piece of an asteroid from the asteroid belt to the surface of the Earth?

(a) Most asteroids will eventually explode, sending pieces to the Earth.
(b) Impacts can break pieces off, sending them flying directly to the Earth.
(c) Alien spacecraft inadvertently pick them up and deliver them during their frequent visits to Earth.
(d) Impacts can disrupt the asteroid, and interaction with Jupiter will send the pieces to Earth.
(e) We can never get pieces of asteroids.

2 (6 pts) Describe how the visible appearance of Jupiter would change if it rotated in 30 hours instead of 10 hours.

3 (8 pts) The volcanoes on Neptune's moon Triton are being powered by the Sun. The nitrogen ice on Triton's surface acts as a greenhouse material that prevents infrared radiation form escaping. Where does this infrared radiation come from? Remember, the ice also blocks the infrared radiation from the Sun!

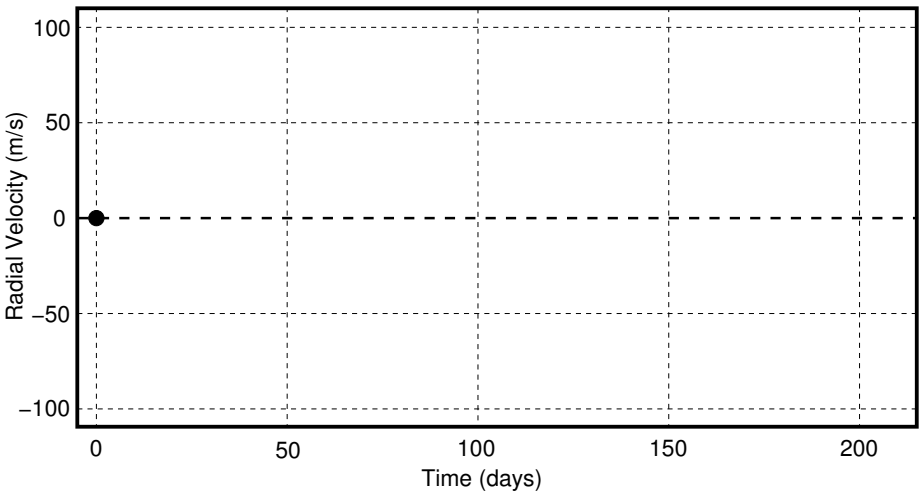
On the next two pages are four **False** statements. For each of these statements, explain what is wrong with the argument. All of these arguments come from seemingly serious web pages, really they do.

4 (8 pts) "Short period comets are disintegrating so fast that after ten thousand years there will not be any remaining. Since we still see comets in our skies, the solar system must be very young."

5 (8 pts) "The prevailing theory for the origin of the asteroids – this collection of highly visible "debris" orbiting between the planets Mars and Jupiter – is that these, indeed, were the results of a formerly exploded planet."

6 (8 pts) "If the planets and their 63 known moons evolved from the same material, they should have many staggering similarities. After several decades of planetary exploration, this expectation is now recognized as false. For example, the moons of Saturn are composed of ice while the Earth's moon is composed of rock."

7 (8 pts) "The radioactive decay of Uranium produces not only lead but also helium. The helium passes into the Earth's atmosphere, but the amount of helium in the atmosphere is too small. It would only require some thousands of years to produce what is there. There should be much more helium if the process has gone on for millions of years."



The table on the right shows the observational data for two planets orbiting two stars exactly like our Sun.

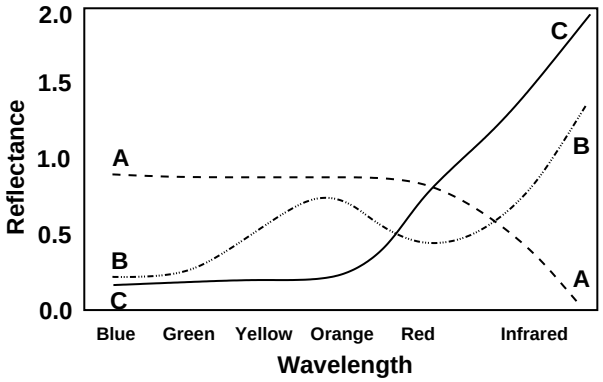
Planet	Period [Days]	Maximum Radial Velocity [m/s]
A	50	50
B	800	100

8 (8 pts) On the graph above, draw how the radial velocity of each of the two planets would change over 200 days of observations (label each line). Assume that the planets have a radial velocity = 0 m/s on Day = 0.

9 (2 pts) Which planet is more massive? ◯ A ◯ B

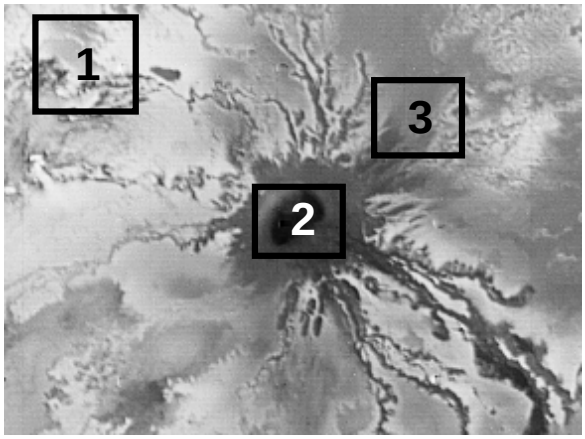
10 (2 pts) Which planet is closer to the star? ◯ A ◯ B

11 (6 pts) In class I said that Carbonaceous Chondrite meteorites are composed of "primitive" materials. Describe what is meant by "primitive" materials.



On the left is the reflectance spectra of three different regions on the surface of Jupiter's moon Io. The spectra were taken in an area around a volcanic caldera. Use these spectra to answer the questions on this page.

12 (6 pts) Describe the color and brightness of the three regions if you were to observe them **visually**.



13 (3 pts) To the left is a visible light image of the area where the three spectra were taken. Match each of the three numbered regions with one of the above spectra. Since this is a black and white image you will have to rely on clues other than color.

Region #1 _____

Region #2 _____

Region #3 _____

14 (6 pts) Notice that the for region **C** the reflectance in the infrared is greater then 1.0. Explain why this is.

For the next two questions, assume that the Sun will remain unchanged for the next 10 billion years.

15 (8 pts) Describe the geological activity of the Earth 10 billion years from now (4pts) and what the surface of the Earth may look like (4pts).

16 (8 pts) Describe the geological activity of Jupiter's moon Io 10 billion years from now (4pts) and what the surface of Io may look like (4pts).

17 (2 pts) And finally, list the top 100 objects in the solar system.