Astronomy 2310
Instructor: Professor Michael Brotherton

Exam 1 Practice Test 2

This exam covers chapters 1-4 of Ryden and Peterson's text Foundations of Astrophysics. Calculators are allowed. The appendices of the text providing various constants and values required for the exam are given on the final pages. Please write all answers clearly and use good English. Box final answers when calculations are required. Use units when appropriate. Show your work. Draw pictures when helpful.

Write your name on every page in case pages become separated!

Part 1
Short Answers (Do **ONLY 8 of 10** questions, 5 points each**)**

1. Why isn't there a total eclipse of the sun every month?

2. What are Kepler's three laws? Be as complete as possible.

3. What is the difference between synodic and sidereal periods? Stating definitions is enough.

4. How does the Copernican model explain the retrograde motion of Mars?

5. Is the sun ever directly overhead Laramie, Wyoming? Why or why not?

6. Name two observations that show that the Earth is not stationary and explain how they show this.

7. Name three observations Galileo made with the telescope showing something previously unknown.

8. What is a parsec in astronomical units? Derive it if you don't remember the value.

9. Why is the Earth's day getting longer? Give as a complete answer as you can.

10. If it is about 9pm at night, and the moon is directly overhead, what phase is it in? If you don't remember the name of the phase, at least draw it.

Go on to part 2 on the next page!

Part 2
Calculational problems (4 questions, 15 points each)

1. A comet is observed to return to the inner solar system every 64 years. What is the semi-major axis of its orbit in astronomical units?

2. What is the ratio of the angular sizes of Mars at opposition compared to conjunction? Assume circular, coplanar orbits for the Earth and Mars.

3. What is the altitude (in kilometers) of a geosynchronous satellite over Mars? (See Table A.3 for Mars info.)

4. If we wanted to send a spacecraft to Jupiter using a Hohmann transfer orbit, what direction would we propel the spacecraft? How much of a "delta v" would we need to apply? How long would it take to reach Jupiter, assuming we sent the spacecraft during an optimal launch window? You might want to use the vis viva equation: $v^2 = GM\,(2/r - 1/a)$, and drawing figures might help, too.