

Assignment # 9

NOT DUE

**Instructions**

On this and future assignments, please write your name on all pages and staple all pages together. Write very clearly!

Please be sure to explain your answer to all word problems briefly but carefully, and to show all your work on the calculations. The grade on each problem will reflect more the verbal explanations and the calculations shown rather than the final answers given in the back. (In fact, the answers to most of the quantitative questions from the book are given in the back and I'll give you the answers to most of my quantitative questions right on the assignments).

You may work with others on the homework problems, but you must write them up yourself, using your own words and calculations. If you hand in a paper nearly identical to someone else's, neither of you will get any credit because we won't know whether or not you actually did the work.

Also, the solutions will be shown on our class website very soon after the due date: <http://www.ucsb.physics.edu/~astro1/fall2009>. This assignment will not be graded.

**SHOW ALL WORK**

1. a) Why are black holes often observed as X-ray sources? b) What is meant by the statement that space is curved near a black hole? c) If you threw a rock into a black hole, how long would it appear to take for it to get to the event horizon?
2. a) How are heavy element abundances, ages, and locations of stars related in our galaxy? b) Explain the concept of Population I and II, and the implications for the formation of the Galaxy?
3. What two predictions of Einstein's Theory of Gravity, general relativity, were confirmed by the changes in orbits of the binary pulsar? (Hint: One is in the book and the other is the decay of the orbits due to the emission of a particular type of radiation...)
4. What is a spacetime diagram?