No late papers will be accepted. Since the topics on the problem set will be on the Midterm Exam (16 Feb), the answers will be handed out on the 11th.

1. We derived the equation of a planet in orbit around a star of mass M,

$$\frac{e^2-1}{2} = \frac{1}{2}\left(\frac{dr}{d\tau}\right)^2 + \frac{l^2}{2r^2} - \frac{M}{r} + \frac{l^2 M}{r^3},$$

   where e and l are constants specific to the orbit.

   (a) What is the interpretation of each term?

   (b) Outline the derivation of this equation. What ideas went into the derivation?

   (c) I measure the energy of a planet of mass m. Is the answer me or $\frac{1}{2}m(e^2-1)$ or something else? Explain.

2. Problem 9.2 in the textbook.

3. Problem 9.6 in the textbook.

4. Problem 9.8 in the textbook.

5. You now know enough about general relativity to understand many of its application to single objects. Read §11.1 in the textbook, which is about gravitational lensing. Then do problems 11.6 and 11.7.