Homework 7

Due March 28th

Given the Post Newtonian Parameterization from class

$$ds^2 = -\left(1 - \frac{2GM}{c^2 r} + 2(\gamma - \beta)\left(\frac{GM}{c^2 r}\right)^2 + \dots\right) dt^2 + \left(1 + 2\gamma\left(\frac{GM}{c^2 r}\right) + \dots\right) dr^2 + r^2 d\Omega$$

Derive the leading non-Newtonian expressions for:

1. The deflection angle of a light ray approaching a star of mass M at impact paramter b.
2. The perihelion procession of a planet whose orbit has a semi-major axis a and eccentricity ϵ.
3. The round-trip excess time delay of a signal propagating from earth to an object a distance r_R away from the sun, along a path whose closest approach to the sun is r_1.

To get full credit for this assignment, if you're following along with the textbook from chapters 9 and 10 and cite his results, the details that are omitted from the textbook must be filled in. That is, you can't say "send x to $(1-\gamma)\,x$ and use formula y from the book)." or anything like that.