ASTR 2030 Black Holes Fall 2003. In class group Project 3. Th Sep 25.

Scribe's name:

Names of other members of the group:

Negative Mass

You, standing on the Earth, hold a negative mass object (mass m) in your hand, then let go.

1. According to the Principle of Equivalence, which way does the negative mass object go: up or down? Why?

2. According to Newton's laws of Gravity, which way does the negative mass object go: up or down? [Newton's law asserts that a mass m at radius r from the center of a mass M feels an acceleration g given by

$$mg = \frac{GmM}{r^2}$$

   where G is a constant, Newton's Gravitational constant.]

3. Suppose that the negative mass m were made more negative to the point where its negative mass were less than minus the positive mass M of the Earth (in other words, suppose that $m < -M$). What would happen then? [Hint: Think about whether the negative mass would attract or repel the Earth. Would that attraction or repulsion beat the attraction or repulsion of the Earth on the negative mass?]