Physics 201, Fall 2007 Josh Erlich
Problem Set 3
Due Wednesday, September 26.

Problems from Taylor, Zafiratos and Dubson:

1.33, 1.47, 1.51

Additional Problems

1. *Time Dilation Due to Earth's Rotation*

Assume the Earth is an inertial sphere which rotates on its axis once a day. The circumference of the Earth at the equator is 40,000 km. Compared to a clock at the center of the Earth, how much time (in seconds) is lost each day on a clock located at the equator, as a result of relativistic time dilation?

2. *Push-the-Button Game*

Two game show contestants A and B stand beside buttons that they are to push as soon as they hear a bell. Whoever pushes their button first wins. Contestant A stands 10 feet to the left of Contestant B as measured in their rest frame.

Suppose in the contestants' rest frame the buttons are pressed simultaneously, *i.e.* the game is a tie.

a) In a fast-moving frame moving towards the right, which contestant pushes the button first?

b) In a fast-moving frame moving towards the left, which contestant pushes the button first?