Homework 6

Due Tuesday, February 19th in class

Reread Ch. 4 of Jespersen and Fitz-Randolph and add Ch. 5 and read Rovelli Ch. 4.

Three questions to think about and answer:

1. Outlaws are escaping in a getaway car, which moves at $\frac{3}{4}c$, chased by police, moving at only $\frac{1}{2}c$. Realizing they can't catch up, the police attempt to shoot out the tires of the getaway car. Their guns have a muzzle velocity (speed of the bullets relative to the gun) of $\frac{1}{3}c$.

   (a) Does the bullet reach its target according to Galileo?

   (b) Does the bullet reach its target according to Einstein?

2. A rocket ship travels away from Earth at 1/2 c. A clock on Earth measures 100 s between two events.

   (a) What time interval would a clock on the rocket ship measure between the same two events?

   The rocket ship launches a probe that is moving at 3/5c with respect to the rocket.

   (b) What time interval would a clock on the probe measure between the same two events?

3. A stick moves rightward with speed $3/5c$ with respect to the ground. The length of the stick in the ground frame is 1 m. You move rightward with speed $1/2c$ with respect to the ground. What is the length of the stick in your frame?