

Homework 1 (10 points for each problem)

1. Prove that the interval defined as $ds^2 = c^2 dt^2 - dr^2$ is invariant for any inertial reference frame.

2. Show that the relativistic interval is not invariant under the Galilean transformation.

3. From the condition of invariance of the relativistic interval derive Lorentz transformations (for two reference frames moving along x axis) by generalizing the rotation operators for the pseudo - euclidean space.
Express these transformation in the matrix form.

4. Obtain Galilean transformations from Lorentz transformations