

Math 678. Fall 2011.

Homework #4.

Due Wednesday 11/02/11 in class.

Solutions should represent individual work, with all necessary details. Only facts discussed in class or given in the main textbook can be used without proof (except the facts known from calculus).

(1) Problems 19, p.89 Evans

(2) Problems 22, p.89 Evans

(3) Let $|a| < 1$ be constant. Prove that the wave equation $u_{tt} = u_{xx}$ in $\mathbb{R}^3 \times \mathbb{R}$ is preserved by the Lorentz transformation:

$$\begin{aligned} s &= \frac{t - ax_1}{\sqrt{1 - a^2}} \\ y_1 &= \frac{x_1 - at}{\sqrt{1 - a^2}} \\ y_2 &= x_2, \quad y_3 = x_3 \end{aligned}$$