

HOMEWORK 9

MATH 3120

Unless stated otherwise, the notation below is as in class. You can assume that all functions are C^∞ unless explicitly assumed otherwise.

Question 1. Show that the function of problem 4 in homework 8 verifies the Rankine-Hugoniot conditions if and only if $\beta = 1/2$.

Question 2. Formulate the definition of weak solutions, shocks, and the Rankine-Hugoniot conditions for systems of conservation laws. Give a brief sketch of the proof of the Rankine-Hugoniot theorem for systems (you do not have to do all the proof; it suffices to indicate how to modify the $N = 1$ case done in class. Your answer should be two or three sentences long.)

Question 3. Show that the $1d$ compressible Euler equations stated in class form a system of conservation laws.