

Partial Differential Equations

Homework 2

Due on March 6

1. Consider the initial value problem for the non-homogeneous inviscid Burgers equation given by

$$\begin{cases} u_t + uu_x = -u \\ u(x, 0) = -x \end{cases},$$

where $u : \mathbb{R}^2 \rightarrow \mathbb{R}$ is assumed to be of class C^1 .

- (a) Show that this problem has a unique local solution.
- (b) Write the unique solution to this problem explicitly.
- (c) Can you interpret what is going on?