M731–Partial Differential Equations HOMEWORKS – Fall 2010

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SET 1

Robert Owen's Book Section 1.1: 1, 2, 3, 4a) 4b).

Additional Problems

(1) Write down an explicit formula for a function u solving the initial value problem

$$\begin{cases} u_t + b \cdot \nabla u + c\, u = 0 & \mathbb{R}^n \times (0, \infty) \\ u = g & \mathbb{R}^n \times \{t = 0\} \end{cases}$$

where $c \in \mathbb{R}$, $b \in \mathbb{R}^n$ and $g : \mathbb{R}^n \to \mathbb{R}$ are given.

(2) Let f be a continuous function on an open set $D \subset \mathbb{R}^n$ such that

$$\int_{D_0} f(x)\, dx = 0 \qquad \text{for all} \quad D_0 \subset D.$$

Prove that then $f \equiv 0$ on D.