All problems from Evans refer to the 2nd edition of his book.

M540 Homework Assignment 1
Due Friday, January 24

Out of Evans:
Page 12: 1*, 4 (use induction on problem 4)
Page 85: 2, 3, 4**, 5

Problem A. Derive an explicit formula for a solution \( u = u(x, t) \) to the initial-value problem

\[
\begin{align*}
    u_t + b \cdot \nabla u + cu &= 1 & \text{in } \mathbb{R}^n \times (0, \infty) \\
    u &= g & \text{on } \mathbb{R}^n \times \{0\},
\end{align*}
\]

where \( b \in \mathbb{R}^n, c \in \mathbb{R} \) are constants, and \( g : \mathbb{R}^n \to \mathbb{R} \) is a given smooth function. Here \( x = (x_1, x_2, \ldots, x_n) \), \( \nabla u \) refers to the vector of spatial derivatives, i.e. \( \nabla u = (u_{x_1}, \ldots, u_{x_n}) \).

* For problem 1 on page 12 you can just answer parts a and b for the PDEs on page 5.

** For problem 4 on page 85, by “direct proof,” Evans means without using the Mean Value Property, just basic calculus.