

Partial Differential Equations

Homework 3

due October 15, 2009

1. Prove the following version of the Poincaré inequality: Let $U \subset \mathbb{R}^n$ be open, bounded, with smooth boundary. Then there exists a constant c such that for every $u \in H_0^1(U)$,

$$\|u\|_{L^2(U)} \leq c \|Du\|_{L^2(U)}.$$

2. Evans, p. 345, Problem 1
3. Evans, p. 345, Problem 2
4. Solve Evans, p. 345, Problem 3, by direct computation.
5. Solve Evans, p. 345, Problem 3, by referring to the solvability condition arising through the Fredholm alternative.