

Partial Differential Equations

Homework 10

Due on May 15

1. Decide whether each statement is true or false, and explain why.

- (a) The function $f(x) = e^{-|x|}$ belongs to $W^{1,p}(\mathbb{R})$ for every $1 \leq p < \infty$.
- (b) The function $f(x) = |x|^\alpha$ belongs to $W^{1,p}((-1, 1))$ whenever $\alpha > 1 - \frac{1}{p}$.
- (c) The function $f(x) = |x|^{-1/p}$ belongs to $L^p((-1, 1))$ for every $1 \leq p < \infty$.
- (d) If $f \in W^{1,p}(\mathbb{R})$ and $p > 1$ then f has a continuous representative.
- (e) The function $f(x) = \frac{1}{1+|x|}$ belongs to $H^1(\mathbb{R})$.