

Partial Differential Equations

Homework 11

Due on May 22

1. Consider the function

$$u(x, y) = \log(1 - \log(r)), \quad r = \sqrt{x^2 + y^2},$$

defined a.e. in the unit disk

$$D = \{(x, y) \in \mathbb{R}^2 : x^2 + y^2 < 1\}.$$

- (a) Show that $u \in H^1(D)$.
- (b) Compute the trace $\text{Tr}(u)$ on the boundary $\partial D = S^1$. Does u belong to $H_0^1(D)$?