

## MATH 231A: LECTURE 4 REFERENCES

### 1. SOBOLEV SPACES AND TRACES

- For the basic definitions and approximation theorems for the space  $H^1(\Omega)$ , see Evans Chapters 5.2 and 5.3.
- For the definition of traces, as well as the space  $H_0^1(\Omega)$ , see Evans Chapter 5.4.
- Another refresher on weak derivatives can be found in Folland's chapter on distributions, and in Chapter 7 of Lieb and Loss' book [1] (I recommend the latter book in general for analysis topics related to PDE).

### 2. DIRECT METHODS IN THE CALCULUS OF VARIATIONS

- There is a somewhat complete discussion of this in the context of the Laplace equation in the posed lecture notes.
- There is a more general treatment of this material in Chapter 8.2 of Evans. This includes functionals leading to many interesting non-linear problems as well.
- For an alternative treatment of this material, including Sobolev spaces, see Chapter 8 of Jost.

### REFERENCES

- [1] Lieb, Elliott H.; Loss, Michael **Analysis**. Second edition. Graduate Studies in Mathematics, 14. American Mathematical Society, Providence, RI, 2001. xxii+346 pp.