Reading instructions for part 3 of Partial Differential Equations.

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Reading material: Course notes *"The Obstacle Problem."* at the course web-page.

Reading:

1. **Lecture 1 December 3rd.** Read the introduction and chapter 2. The chapter has a long appendix on Sobolev spaces. That appendix more of an overview with some background analysis needed in order to understand the main part of the chapter. You are not expected to proe the results in the appendix.[1] You must however have a basic understanding of the definitions and concepts in the appendix. Make sure that you learn the following

   - The concept of weak convergence and weak compactness of the spaces L^2 and $W^{1,2}$

   - The concept of a weak derivative.

   - Knowing about the problem of defining boundary values for functions in $W^{1,2}$ as well as the concept of Traces.

   You don't have to know how to prove any of these results but you should have an idea of how the proofs are done (How else can we know that we have understood a concept?)

2. **Lecture 2 December 10th.** Chapter 3 and Chapter 4.

3. **Lecture 3 December 17th.** Chapter 5.

Exercises: Each chapter in the notes have some exercises. Try to look at as many as you can. Some more might get added as we go along. The homework assignment for the final part of the course will be taken from these exercises - at least in part.

Homework assignments: Since this is a theoretical than what is usually taught at masters level the homework assignments will allow much freedom in order to give everyone a chance to pass. In each exercise section of the lecture notes *"The Obstacle Problem."* there are some exercises marked with one or

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[1]And very few proofs are included. Most results have some motivation though. At times it is a proof sketch and at times it is an argument in $\mathbb{R}$ where we can use Fourier series to show the ideas.

two stars (that is * or **). You must hand in one exercise, among the ones marked with stars, from each chapter (except the introduction). That is you must hand in 4 exercises in total.

The exercises will be marked with maximum 3 marks where 3 means excellent. Some notice will be payed to the level of difficulty of the exercises you have chosen (the more difficult exercises are marked with **). This might affect the final evaluation, especially if you are aiming for a higher grade in the course.

The homework are to be handed in during the lecture on **the 17th of December** or sent to me by email no later than **the 26th December** (Yes, this is cruel, but it is okay to send it by email before the 26th...). I expect to start marking on the 27th.