Partial Differential Equations (TATA27)
Spring Semester 2015
How to Prepare for the Final Exam

1. When you planning your revision for the exam it worth first reading through the aims I wrote down in the course document. These were to:

   (a) understand what mathematical questions related to a partial differential equation need to be answered;

   (b) construct proofs which answer such questions and <u>think logically</u>;

   (c) recall major results which can be useful in answering such questions (more complicated proofs need not be remembered but you should be able to understand them); and

   (d) relate such statements to the physical situation they model.

   Of these four, the exam will concentrate on testing you ability to perform (b) and (c).

2. Everyone has their own way to revise for an exam, and by now you are all seasoned professionals in this regard. However, the following tips may be useful.

   (a) I have based the content of this course on the main text book (Strauss) and my experience of teaching and researching in the field at various universities. I have not spent much time looking at past papers for the course or the previous lecturers' notes. This means spending a large amount of time studying past papers is unlikely to be very helpful in preparing you for the exam I have written.

   (b) On the other hand, all the information I expect you to know and understand is contained in the English lectures notes I have posted on the course website. (Please note, the Swedish notes are not complete — that will be a task for another year.) You can expect the exam questions to be closely related to the material I have posted on the course website.

   (c) Consequently, a good way to prepare for the exam would be to read and understand the lecture notes and spend time making sure you can answer the homework questions. I have also written a mock exam that is of a similar style to the actual exam. I plan to have posted solutions to all the homework questions on the course website by the 24th May. Personally, I find it useful to try to think up possible questions which might appear in the exam.

3. You should be able to recall from memory all terminology and definitions given in the lecture notes. In addition to this, you should be able to recall the following.

   (a) **First-order equations.** Method of characteristics.

   (b) **Laplace's and Poisson's equation.** Weak and Strong Maximum Principles for Laplace's equation, the Mean Value Property, Poisson's formula, Green's first and second identities.

   (c) **The wave equation.** D'Almembert's formula, the energy for the wave equation, method of reflections.

   (d) **The heat equation.** Weak Maximum Principle for the wave equation, the energy for the heat equation, method of separation of variables.

   (e) **Numerical analysis.** Finite differences, Taylor's theorem.

   Other aspects of the course may of course also be tested, but you won't be expected to recall the precise details without hints.