

## Information on the written exam

February 18, 2021

### Administrative information (hopefully definitive dates).

- Last day to register to the exam: 28 February 2021 (Chalmers) and 8 March 2021 (GU).
- Online written exam: 15 March 2021 (8:30-12:30).
- Last day to register to the re-exam: 24 May 2021 (Chalmers) and 2 June 2021 (GU).
- Re-exam: 9 June 2021 (14:00-18:00).
- Grades: U, 3, 4 or 5 (Chalmers) and U, G, VG (GU).
- The awarded bonus points will be added during the grading process if needed. In order for me not to forget such points, please indicate in your exam if you think you should have bonus points.
- Contact me before the 27th of February via email (with a valid document from FUNKA) if you need more time for the exam.
- The results of your exams will be reported to you as soon as possible. Please consider that I will have to correct more than fifty exams. It is thus not necessary to send me an email asking for your grades.

### Expectations.

- Students are expected to know and be able to apply the main definitions and results (statements and possibly some ideas of the proofs) from the lecture in order to solve various tasks. Students should explain, analyse, evaluate, and demonstrate their mastery of the course content.
- I will not answer questions sent 6 days before the exam.
- The exam may contain multiple choice questions, true and false questions, or open-ended questions.
- The exam may contain industrial tasks (pure and easy computations) and questions assessing students critical thinking skills.
- Since the exam will take place online, no detailed proofs will, most probably, be asked.
- Please explain all steps in your computations and write the mathematics properly (do not just display randomly equations and hope for someone to find the correct one).
- The exam is written in English. You can write your answers in English, French, German or Swedish.
- Write your cid or first numbers of your personnummer (especially if two students have the same names).

- Use a proper pen, use camscanner or equivalent, order your answers and check your final scan before uploading it.
- You may be asked to check a box with a text like this: " I assure that I did this exam on my own without getting help from any other person and that I formulated all the solutions myself. "

**Important concepts and results from the lecture.**

The list below includes relevant concepts and results from the lecture and is provided as an indication or checklist (not as a statement):

- Basic facts of Hilbert spaces.
- Applications of Lax–Milgram theorem.
- Variational formulation, minimization problem, FEM, linear system for BVP in  $1d$ .
- Approximation properties of polynomials and piecewise linear functions.
- Quadrature formulas and numerical methods for IVP, including cG and dG.
- A priori and a posteriori error estimates.
- Stability results for ODE and PDE.
- Derivation of FEM for problems in  $2d$ .

Feel free to post your self designed exam questions on the piazza page of the course (using the label exam).

Questions or comments on this document or related to the exam should be posted on the **piazza** page of the course!