

Dear students in Numerical Methods (NM),

On 12/2, we went through the general linear least squares problem -- pages 788-790 (until Eq. 15.4.10) -- basically all materials on these pages.

We then discussed what a symmetric and positive (semi-)definite matrix is (see start of section 2.9). Positive semi-definite means ≥ 0 and Positive definite means > 0 . Cholesky-decomposition was then introduced. Notice that the check: if (sum ≤ 0.0) in the routine Cholesky checks for positive definiteness.

With Jens, you then worked on implementing both LU decomposition and Cholesky decomposition for two real life Linear Least Squares problems ("Pontius" and "Filip").

On 19/2, we will introduce the last, most advanced and information providing method, namely Singular Value Decomposition (SVD). For this, we will need to review some basic linear algebra stuff. Please read carefully the slides in advance and perform the exercises. It is important that you understand and can work with the discussed concepts. If you have difficulties with some of the concepts, search for additional material on the web (Google is your friend) or in textbooks. At the end of the presentation, the SVD method will be outlined (section 2.6 until page 69 – all material there). Some of the concepts from the slides are repeated on these pages.

It is very important to test yourself on the exercises from the slides. If you have problems solving them, please use the Q&A.

Jens will go through the results with you for Pontius and Filip. Then, you will start working on solving Pontius and Filip using SVD.

BR, Henrik

P.S. On the recorded presentation for lecture 3, an introduction to the Advanced Robotics specialization is mentioned. The link in there is from the corona times and can be neglected.