Introduction to Numerical Analysis:
Week 5

- Textbook : Chapter 4.2, 4.3, 4.4, 4.5 (up to p. 203). Chapters 4.0 and 4.1 are self-study.
- Programming Training:
    1. Complete Doolittle code from lectures
    2. Code the forward substitution and back substitution algorithms, and code functions that find inverses of upper and lower triangular matrices. Finally, code a function which finds the inverse of an arbitrary (invertible) matrix using also 1.
    3. Code matrix inversion using Von Neumanns method.
- Problem Solving:
    1. Problems 4.2.3 and 4.2.4 (only forward substitution)
    2. Find the Gauss eliminated matrix of A on p. 155 in Ex. 1. What does LU-decomposition and Gauss Elimination have in common? Are they different?
    3. If A has an LU-factorization in which L is unit lower triangular, does it also have an LU- factorization in which U is unit upper triangular? Argue or give a proof if time allows it.
    4. Problems 4.2.30, 4.2.31. Verify your answers with code from Programming Training.
    5. Problem 4.4.40 (For (b) and (c) use only the infinity norm. For (a) use only the 2-norm). Help: In (a) you may use that the 2-norm of a symmetric matrix is the largest absolute value of the eigenvalues.