Study Guide for 2019 QR exam
Numerical Linear Algebra (Math 5165)

[Reference: Numerical Liner Algebra, SIAM 1997, Author: L. Trefethen and D. Bau, III]

1: ... (i) Singular Value Decomposition
(ii) LU factorization, and Cholesky factorization
(iii) Steepest descent
(iv) Conjugate Gradient method

Example:

$$A = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix} \quad b = \begin{bmatrix} 2 \\ 5 \\ 8 \end{bmatrix}, X = [x, y, z]^T$$

(1) Find the singular value decomposition of A (2) Use Cholesky factorization to solve $AA^T X = b$. (3) Use LU factorization to solve $AX = b$ (4) Use Conjugate gradient to solve $AA^T X = b$.

2: Part I: Lectures 1 - 5 (Fundamentals)

3: Part II: Lectures 6,7,8, 10, 11(QR factorization and Least Squares)

4: Part IV: Lectures 20, 21, 22, 23 (Direct Methods)

5: Part VI: Lectures 32 33, 35, 38 (Iterative Methods)