

STT 465

Quick Review of Linear Algebra

Great Books

- Matrix Computations by Golub & Van Loan
<http://www.cs.cornell.edu/cv/GVL4/golubandvanloan.htm>
- Matrix Algebra From a Statistician's Perspective by D. Harville
<http://www.springer.com/us/book/9780387949789>
- Several by S.R. Searle
<http://www.wiley.com/WileyCDA/WileyTitle/productCd-0470009616.html>
<http://www.wiley.com/WileyCDA/WileyTitle/productCd-0471322075.html>

(and many others...)

- Good books on linear models will also provide a basic review of linear algebra
- Seber & Lee
<http://www.wiley.com/WileyCDA/WileyTitle/productCd-0471415405.html>
- Searle
<http://onlinelibrary.wiley.com/book/10.1002/9781118491782>

Basic Concepts

1. Vectors
2. Matrices as collections of vectors
3. Matrix Dimensions
4. Matrix Transpose
5. Square matrix
6. Matrix Addition & Subtraction
7. Matrix Product
8. Identity matrix
9. Orthogonal and Orthonormal matrices
10. Matrix Inverse (and generalized inverse)
11. Symmetric matrices
12. Positive definite and positive semi-definite matrices
13. Matrix factorizations
 - Singular Value decomposition
 - Eigenvalue decomposition
 - Cholesky decomposition
14. Matrices, linear spaces and orthogonal projections.
15. Rank
16. Systems of linear equations

Matrices and Random Variables

Matrices and random vectors

- 17. Definition of a random vector
- 18. Expected value and co-variance matrix of a random vector.
- 19. Linear combinations of random variables
- 20. Expected value and co-variance matrices of linear transformations
- 21. Quadratic forms
- 22. Distribution of quadratic forms [discuss it only briefly]

Multivariate Normal Distribution

- 23. Definition
- 24. Marginal and conditional distributions
- 25. Distributions of linear transformations of MVN random variables
- 26. Simulation of MVN random vectors