Engineering and Science Mathematics 2B

Review for the Final Exam

May 24, 2003, 18:30–20:30, Sports Hall 1

1. Solve a system of linear equations, *matrix inversion*: See handouts.
2. Concept of vector space, linear independence, basis; linear transformations: definition, *representation by a matrix*, *change of basis*;.
3. Eigenvalues and eigenvectors, in particular with regard to the special properties; determinants; diagonalization.
4. Fourier Series: compute the series, properties. Concentrate on the complex Fourier series!
5. Fourier transform: Compute the transform, inverse Fourier transform, properties, *Fourier transform of convolution*, Parseval theorem.
6. Delta function: Definition, representations.
7. Probability: Outcomes, events, sample spaces, definition of probability, conditional probability, *Bayes' rule*.
8. Permutations and Combinations.
9. Distributions: Know the Binomial, Poisson, and Gaussian distribution. Know how to compute the mean and variance using the moment generating function.

- Note that the exam is in Sports Hall 1, not in the Naber Hall as published on the IUB exam schedule.
- No calculators.
- Most problems will be similar to the ones on the homework sheet.
- Many computations will involve complex numbers. If you have difficulties with complex numbers, you should practice manipulating them.
- The ESM 2A homework sheets for Linear Algebra and Probability are on the web and a good source for practice problems.

  `http://math.iu-bremen.de/stoll/teaching/ESM2A-2003-Spring/schedule.html`
- The following topics should be revised, as they may be required as part of some question: Equations for lines and planes; distance of a point to a line or plane; distance between two lines; Orthonormal bases, Gram-Schmidt orthnormalization, Hermitian Matrices and operators.