Massachusetts Institute of Technology
Department of Electrical Engineering and Computer Science

6.432 Stochastic Processes, Detection and Estimation

Recitation 3 Outline

February 18, 2004

More on Symmetric Positive Definite Matrices

1. Matrix square roots
   - Definition and construction from diagonalization
   - Nonuniqueness and the unique symmetric, positive semidefinite square root
2. Applications of square roots
   - Simulation (shaping)
   - Decorrelation (whitening)
3. Principal components analysis (PCA)
   - Definition and relation to eigendecomposition
   - Direct calculation from empirical data via the singular value decomposition (SVD)

Hypothesis Testing for Gaussian Random Vectors

1. General Form of Likelihood Ratio Test
2. Special Cases
   - Equal Covariances: Correlator
   - Diagonal Covariances: Matched Filter
   - Repeated Measurements: Sample Mean