

010294100

IN MODELLING

Statistical Analysis of Models, Examination. 19.10.2004

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Note to the students: The answers may be written using either English or Finnish Language. Any books (except dictionaries), lecture notes, calculators, etc. are prohibited!

1. Consider the n-dimensional Gaussian distribution with the likelihood function

$$p(x) \simeq Const \times e^{-\frac{1}{2}(x-x_0)'C^{-1}(x-x_0)}$$

Determine the constant *Const* so as to get the normalized pdf.

2. Describe the idea of the Bootstrap Algorithm. What does resampling mean in this case?
3. Derive expressions for the least squares estimates of the coefficients  $b_0, b_1$  of a straight line  $y = b_0 + b_1x$  fitted to the data  $(x_i, y_i), i = 1, 2, \dots, n$ .
4. Describe the Monte Carlo MarkovChain (MCMC) algorithm and its use. What kind of models can be analysed using MCMC methods and why?
5. Give the Bayes formula. Explain the meaning of the marginal and conditional distributions.