

010294100 MALLIEN TILASTOLLINEN ANALYYSI

Statistical Analysis ^{in Modelling} of Models, Examination.

10.01.2005 Prof. Heikki Haario

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. Give the Bayes formula. Describe the reasons that often prevent the use of it in high dimensional, nonlinear problems.
2. Describe the idea of the Bootstrap Algorithm. What does resampling mean in this case?
3. Describe the Metropolis MCMC algorithm. In which ways do the MCMC algorithms extend the scope of statistical analysis?
4. Describe a) the inverse transform method b) the accept-reject method to produce random samples from a given probability distribution.
5. The parameter θ in the model $y = xe^{-\theta x}$ is to be estimated by measured data (x_i, y_i) , $i = 1, \dots, 5$. In addition, the prior distribution for θ is given by $N(x_0, \sigma^2)$. Give a procedure by which you can determine the posterior distribution of θ .