Computing in Statistics, 22S:166
Lab 4 for people who have taken 22S:138
Oct. 19, 2007
R packages for MCMC

The following R packages are very useful for Bayesian analysis and MCMC, and are installed on the DIVMS network. (Most of them aren't installed on the PC's in SH 41 yet.)

- `BayesValidate`: to verify the correctness of MCMC sampler code
- `boa` and `coda`: convergence assessment and output analysis
- `geoR`: frequentist and Bayesian spatial data analysis
- `LearnBayes`: graphical and computational functions for simple Bayesian analysis
- `MCMCpack`: functions to perform MCMC for certain specific models; functions useful to people coding their own MCMC samplers in R
- `ramps`: Bayesian spatial and spatiotemporal data analysis

For this lab, you may do one or both of the following activities:

1. Bayesian linear regression using MCMCpack

   Download the dataset `normtemp.dat` from the Datasets section of the course web page. Read the file `normtemp.info` to learn what the three columns of data are. Use the `MCMCregress` function in the `MCMCpack` package to fit a linear regression model with body temperature as the predictor variable and heart rate as the response variable. First use the default noninformative prior. Then supply informative normal and inverse gamma priors for the respective model parameters.

   Use the `coda` package to summarize the MCMC output numerically and graphically.

2. Graphing and numerically approximating Bayesian joint posterior densities using functions in `LearnBayes`

   Work through the examples in Chapter 5 of *Bayesian Computation with R* by Jim Albert. You may borrow the book from Prof Cowles for the hour.