

# Computer-Intensive Statistics

## Assessment Exercises

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Students should talk to their supervisors to find out whether or not their department requires some of this work as part of any formal accreditation process.

**Ex 1** There is another type of bootstrap-based confidence interval not discussed in the lectures, called *ABC*. Use the references to find out about it, and write up a description of the method and a comparison of its strengths and weaknesses (compared to the methods included in the lecture notes).

**Ex 2** Thursday's practical analysed only part of the Australian AIDS survival data. Extend the analysis to the complete dataset: you will need to take 'state' into account (for a classical analysis see Venables & Ripley, 2002, 379ff), and should allow for many minutes of computation.

Write up the analysis you did (and for those of you who have not written up a Bayesian analysis before, you need to think about the choice of priors).

**Ex 3** Consider a probit model for LD50 for the following data

dose	animals	deaths
50	5	1
100	10	4
200	5	2
300	10	6
2000	5	4

with a suitable vague prior. Find a suitable HPD region for LD50. How does it compare to a logit model and to a classical GLM analysis such as that shown for the budworm data in Venables & Ripley?

**Ex 4** (For those with computer-intensive projects.)

Think about how you could organize the algorithms that are used in your field to make use of multiple CPUs, either a shared-memory computer with 24 conventional CPUs or of a GPU-based 'personal supecomputer'. Prepare a page or two (no more) of write-up for a non-specialist audience on which approaches are most promising in such an environment (and why).

Ex 5 (For those with previous experience of BUGS or JAGS.)

WinBUGS, OpenBUGS and JAGS all support models with censoring in slightly different ways (see Appendix A).

Program exercise 2 in the BUGS dialect you use, necessarily using proper priors.

(There are examples in the BUGS examples manuals which will help you, e.g. those on 'mice' and 'kidney'. This is a large dataset for BUGS and you might want to experiment with a subset at first.)