An Intermediate Course in Statistical Computing

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I have just completed teaching the latest incarnation of a course on Statistical Computing for second year graduate students in Statistics. This talk summarizes my course and includes responses to comments made by Peter Dalgaard in his talk at the UseR 2009 conference. My topics include

1. Elementary numerical analysis. I begin with FAQ 37, with focus on the floating point representation of numbers, prevention of disasterous cancellation, and the mechanics of the QR decomposition.

2. Parsing. Precedence of operations, Polish notation, parsing and the use of the same parser for arithmetic, `?plotmath`, and model formulas.

3. Interprocess communication. I use `system`, `shell`, and for Windows `RExcel` and `statconnDCOM`.

4. Graphics. I discuss the construction of regular graphics and lattice graphics. Focus is on the incremental development of complex graphical displays and understanding the tools needed for such development.

5. Packages. The course requires each student to construct a small R package. The goal is to understand the discipline and the mechanism of packaging software so others can use it. We cover methods, function design, debugging, and documentation with `.Rd` files.