Study guide for Statistical Computing, updated March 27, 2013
STAT:5400

Resources:

- Online lecture notes from 22S:166 (main source)
- Braun, W. and Murdoch, D. *First Course in Statistical Programming with R*
- Jones, Maillardet, and Robinson. *Introduction to Scientific Programming and Simulation Using R*. Chapman and Hall.

Note: Questions on Statistical Computing will be integrated into either the Mathematical Statistics and Probability exam or the Applied Statistics exam (or possibly both).

Topics:

Writing R functions
  - passing arguments and returning results
  - control structures -- loops, if/then/else, etc.

Finding zeroes of functions:
  - Binary search
  - Newton's method

Bootstrap
  - Nonparametric bootstrap
  - Parametric bootstrap
  - The bootstrap principle
  - Bootstrap bias correction
  - Bootstrap percentile-method confidence intervals

Jackknife

Simulation studies
  - Using simulation studies to assess:
    - Characteristics of estimation procedures
      - Bias
      - Mean squared error
      - Interval width
      - Interval coverage
    - Characteristics of hypothesis-testing procedures
      - Size
      - Power
  - Simulation study design
    - Choosing factors to study
    - Determining number of replications
  - Interpreting simulation study results
Relational database concepts
  First, second, and third normal forms
  Primary keys and foreign keys
  Referential integrity