Study guide for Statistical Computing, updated March 27, 2013

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