## MAIN TOPICS FOR FINAL

All topics from Exams 1 and 2, plus:

(1) Expectation
   (a) Definition in continuous and discrete cases.
   (b) Linearity of expectation.
   (c) Product formula for independent random variables.
   (d) Indicator variable technique for computations.

(2) Variation
   (a) Definition in terms of expectation, how to compute directly.
   (b) Nonlinearity formulas.
   (c) Sum formula for independent random variables.
   (d) Covariance and correlation.

(3) Sums of random variables
   (a) Convolution definition and calculations in discrete and continuous cases.
   (b) Sum of 2 normal random variables is normal.

(4) Laws of Large Numbers
   (a) Weak LLN: idea and statement.
   (b) Chebyshev inequality and bounding from variance formulas.
   (c) Applications: Monte-Carlo methods.
   (d) Connection with Strong LLN.

(5) Central Limit Theorems
   (a) CLT for iid random variables: idea and statement.
   (b) Applications to statistics.

Expect several True/False questions, followed by 3 other questions (possibly with multiple parts). The exam will be about one and a half times the length of the two midterm exams.

The exam is cumulative, but weighted towards the end of the semester.

Use of notes, books, or calculators will not be permitted during the exam.