Fall 2008
Econ 500, Quantitative Methods in Economic Analysis I
Course Outline for Part II (second half of semester)

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Course requirements: Three graded homework assignments (50%) and an exam (50%). Recitations will be used to review the solutions to practice problems and, on occasion, for the presentation of new material. The exam will be held during the finals week exam period scheduled for this class: Wednesday, December 17, 2:15 – 4:15 p.m. (At this point, the university still describes the exam schedule as “tentative.” But changes are unlikely.) Your overall grade for Econ 500 will be an equally-weighted average of grades in Parts I and II.

Course webpage: http://www.econ.iastate.edu/classes/econ500/Schroeter/F08index.htm

Required text:

Prerequisites: The material in last summer's M.S.-level "Math camp" -- outline available on the department website:

http://www.econ.iastate.edu/programs/graduate/gradNewStudentInfo.asp

-- and the material covered in Part I of Econ 500 are the prerequisites for Part II.

Course content: Part II of Econ 500 will focus on the elements of probability and statistics that students will need for the required M.S.-level econometrics course, Econ 571, and for understanding economic models of decision-making under uncertainty. A list of specific topics, with the corresponding sections of Wackerly, Mendenhall, and Scheaffer, follows:

Axiomatic definition of probability. (2.2-4)

Conditional probability and independence of events. (2.7, 2.10)

Random variables. (3.1, 3.2, 4.1, 4.2)
Discrete and continuous random variables. Probability mass functions, probability density functions, cumulative distribution functions.
Jointly distributed random variables. (5.1-4)
Joint and marginal probability mass (density) functions. Conditional probability mass (density) functions. Independence of random variables.

Mathematical Expectation. (3.3, 3.9, 3.11, 4.3, 4.9, 4.10, 5.5-8, 5.11)

Normal distribution. (4.5, 5.10, 7.3)

Transformations of random variables. (6.1, 6.2, 6.4)
Finding the p.d.f. for a differentiable, 1-to-1 function of a continuous random variable. Lognormal application.

Distributions of sample statistics: normal populations. (7.2)
Sample mean (known population variance). Sample variance and the chi-squared distribution. Sample mean (unknown population variance) and Student's t-distribution. Ratios of sample variances and Snedecor-Fisher's F-distribution.

Basic concepts of inference: estimation. (8.1-5, 9.1-3, 9.7)
Point estimation; bias, efficiency, mean-squared-error, consistency, asymptotic normality. Maximum likelihood estimation. Interval estimation; one- and two-sided confidence intervals.

Basic concepts of inference: testing. (10.1-6)
Null and alternative hypotheses, acceptance/rejection regions, Type I and II errors. Significance level and power of a test. One- and two-sided tests.

Inferences for single samples. (8.6-9, 10.8, 10.9)
Confidence intervals and hypothesis tests on the mean of a normal population: with known variance, with unknown variance. Confidence intervals and hypothesis tests on the variance of a normal population.

Two-variable regression. (11.1-7)