Checklist for ECON 351* Mid-Term Exam, Winter Term 2009

Coverage of exam

Part I: Sections 1-5 on Course Outline; NOTES 1-9.

Format of questions

Part 1: Definitions, Proofs, and Derivations

Part 2: Short Answer Questions (some requiring numerical answers)

Proofs and Derivations to Know for regression model $Y_i = \beta_0 + \beta_1 X_i + u_i$

- Derivation of OLS normal equations, the first-order conditions for the OLS coefficient estimators $\hat{\beta}_0$ and $\hat{\beta}_1$ from the RSS function
- Solution of OLS normal equations to obtain formulas for the OLS coefficient estimators $\hat{\beta}_0$ and $\hat{\beta}_1$
- Proof of linearity and unbiasedness of $\hat{\beta}_1$, i.e., proof that $E(\hat{\beta}_1) = \beta_1$
- Derivation of expression (formula) for $Var(\hat{\beta}_1)$
- Derivation of OLS decomposition equation from OLS SRE $Y_i = \hat{Y}_i + \hat{u}_i$
- Derivations of the t-statistic for $\hat{\beta}_1$ and the F-statistic for $\hat{\beta}_1$
- Derivation of two-sided $100(1-\alpha)$ percent confidence interval for β_1 or β_0
- Basic concepts of hypothesis testing

Important Things to Know about regression model $Y_i = \beta_0 + \beta_1 X_i + u_i$

- Assumptions A1-A8 of the Classical Linear Regression Model.
- Definition and meaning of the following statistical properties of estimators: (1) unbiasedness; (2) minimum variance; (3) efficiency.
- Statistical properties of the OLS coefficient estimators $\hat{\beta}_0$ and $\hat{\beta}_1$.
- Computational properties of the OLS sample regression equation.
- How to compute and interpret OLS coefficient estimates $\hat{\beta}_0$ and $\hat{\beta}_1$.
- How to compute estimated variances and standard errors of the OLS coefficient estimates $\hat{\beta}_0$ and $\hat{\beta}_1$.
- How to compute and interpret the coefficient of determination R^2.
- The error normality assumption A9 and its implications for (1) the distribution of the Y_i values and (2) the sampling distributions of $\hat{\beta}_0$ and $\hat{\beta}_1$.
- How to construct and interpret *two-sided* confidence intervals for β_0 and β_1.
- How to perform *two-tail* and *one-tail* hypothesis tests for β_0 and β_1.