Math 540 - Regression Analysis

Simple linear regression, geometry and algebra of least squares, residuals

Confidence interval and significance test for the slope and intercept, prediction intervals

Multiple linear regression model, the *F*-test and *t*-tests of coefficients, interpretation of standard errors, interpretation of R^2 and adjusted R^2, standardized and studentized residuals

General linear model in matrix form, normal equations

Diagnostics: analysis of residuals, normal probability plots, leverage, outliers and influential cases (Cook's distance, DFITS), multicollinearity (variance inflation factor), autocorrelation (Durban-Watson test), nonlinearity and transformations, curvature and interaction (lack of fit test)

Model building: criteria for variable selection (cross validation, Mallows' Cp), best subsets regression, forward, backward and stepwise regression

Indicator (dummy) variables

Nonlinear regression: Logistic regression

Recommended Textbooks

Norman R. Draper, and Harry Smith, *Applied Regression Analysis*, 3rd Ed. Wiley, 1998.

Douglas C. Montgomery Elizabeth A. Peck, and G. Geoffrey Vining, *Introduction to Linear Regression Analysis*, 4th Ed. Wiley, 2006.

Raymond H. Myers, *Classical and Modern Regression with Applications, 2nd Ed.* Brooks/Cole, 2000.

Sanford Weisberg, *Applied Linear Regression*, 3rd Ed. Wiley, 2005