

## Stat 151A: Final Review Topics

Section numbers refer to Fox unless otherwise noted.

- Simple Linear Regression (Fox Ch 2-4, 5.1, 10.1)
  - Visualizations: 3.1-3
  - Transformations: 4.2, 4.3, 4.4
  - Scalar-sum presentation of simple regression: 5.1
  - Geometric interpretation of simple regression: 10.1
  - Parameters, estimates, random variables: Freedman 2.3 and 2.4, Fox 6.3
  - Goals (association, prediction and causal inference): Freedman Ch 1
- Multiple Regression
  - Scalar-sum version of multiple regression 5.2
  - Matrix version of multiple regression: 9.1, 9.2, Freedman 4.1
  - Geometry of multiple regression: 10.2, 10.3
- Inference
  - The simple regression model and assumptions: 6.1
  - Properties of OLS: 6.1.2
  - Confidence intervals and hypothesis tests (simple): 6.1.3
  - Inference in multiple regression: 6.2.1
  - Confidence intervals and the F-test (multiple): 6.2.2
  - Inference using matrix notation: Chapter 9.3.1, 9.3.2, 9.4.1, 9.4.2, 9.4.3
  - Collinearity: Chapter 13.1 (not 13.1.1-13.1.2)
- Dummy Variables (Fox Ch 7)
  - Dichotomous factors: 7.1
  - Polytomous factors: 7.2
  - Interactions and the principle of marginality: 7.3
  - ANOVA: 9.1.1-9.1.2, 10.4
- Bootstrap (Fox Ch 21, Lab 6)
  - Bootstrapping basics: 21.1
  - Bootstrap confidence intervals: 21.2.1, 21.2.2, [studentized bootstrap notes](#)
  - The bootstrap in regression models (bootstrapping cases vs. residuals): 21.3
- Influence (Fox Ch 11, Lab 7)
  - Influence = high leverage + outlier: 11.1
  - Leverage / hat-values: 11.2
  - Outliers / studentized residuals: 11.3
  - Influence / Cook's distance / COVRATIO: 11.4.1, 11.4.2
- Diagnostics (Fox Ch 12, Lab 7)
  - Non-normal residuals: 12.1
  - Non-constant residual variance: 12.2.1
  - Collinear predictors: 13.2.2
- Model Selection (Fox 13.2.2, 22.1, Lab 7)
  - Model Selection Criteria: Adjusted R<sup>2</sup>, Mallows Cp, AIC, BIC (Fox 22.1)

- Cross Validation (Fox 22.1, [ISLR 5.1](#))
  - Forward, Backward, Stepwise, and All Subsets search methods ([ISLR 6.1.1-6.1.2](#))
- Lasso and Ridge Regression (Fox 13.2.3, [ISLR 6.2](#), Lab 8)
- Logistic Regression (Fox 14.1, Lab 9)
  - The Linear-Probability Model (14.1.1)
  - Logit Models (14.1.2-5)
- Multinomial and Ordinal Regression (Fox 14.2, Lab 10)
  - Multinomial (polytomous) regression: 14.2.1
  - Nested logit models: 14.2.2
  - Ordered logit / proportional odds models: 14.2.3
  - Proportional Odds Assumption (Fox 14.2)
- Nonlinear Regression (Lab 11)
  - Polynomial regression ([ISLR 7.1](#))
  - Regression splines ([ISLR 7.4](#))
  - Generalized Additive Models ([ISLR 7.7](#))
- Regression trees ([ISLR 8.1](#), Lab 11)