

Final Review

Peter Shaffery

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Linear Regression

- How do you derive the linear regression estimators? (RABE 2.5, Lecture 2)
- What theoretical properties do these estimators have? (RABE 3.7Lecture 5)
- What are the important assumptions of a linear regression model? Are any assumptions more important than others? (RABE Ch 2, Lecture 2)
- How do you verify that these assumptions are met? (RABE 4.6-8, Lecture 3+6)
- What do you do if the assumptions aren't met? (RABE Ch 6 and 7 Lecture 10)
- What are the various hypothesis tests that you see associated with linear regression? How are they interpreted? (RABE 2.6 and 3.9, Lecture 2-4)
- How do you choose model variables? (RABE Ch 11, Lecture 8+9)

Generalized Linear Models

- What is the exponential family of distributions? Why does it matter to GLMs? (IGLM 3.2+3.3, Lecture 12)
- What defines a generalized linear models? What makes on GLM different from another? (IGLM 3.4, Lecture 12)
- How do you estimate GLM coefficients? What are the properties of this estimator (mean, variance, etc.)? (IGLM 4.3 + Ch 5, Lectures 12+13)
- What hypothesis tests are available for a GLM? What do they test? (IGLM 5.4-5.7 Lecture 15)
- How to assess model performance? What diagnostics should you perform? (IGLM 7.5-7.7, Lecture 16)
- What problems might occur (if any) that are unique to GLMs? How can you address them? (IGLM 7.7+9.8, Lectures 16+17)
- How do you interpret logistic regression? What other link functions exist for binomial regression? (IGLM Ch 6, Lecture 14)
- How do you interpret a Poisson regression? What variants of Poisson exist? (IGLM Ch 9, Lecture 17)

Hierarchical Models

- Why would you opt for a partially pooled model over a pooled or unpooled model? (Lecture 19)
- What distinguishes a hierarchical model from multiple regression? (lecture 20)
- How do you interpret random effects? (Lecture 19+20)

Bayesian Regression

- What is "Bayesian probability"? (Lecture 21)
- What is the Bayesian equivalent of "maximum likelihood"? (Lecture 22)
- What is the role of the prior in Bayesian analysis? What makes a good prior? (Lectures 21+22)
- How do you perform Bayesian model selection? (Lecture 25)
- How do you diagnose a Bayesian model? (Lecture 24)
- How do you generate predictions from a Bayesian model? (Lecture 24+25)
- What is the role of a sampling algorithm? (Lecture 25)

Miscellaneous

- a. What is a scatterplot smoother? What algorithms exist to smooth scatterplots, and how do you interpret their tuning parameters? (GAM, Lecture 18)
- b. How do we categorize missing data? (Lecture 26)
- c. What can we do to resolve issues with missing data? (Lecture 26)
- d. What is omitted variable bias? How does it impact our ability to draw causal conclusions? (Lecture 27)
- e. Why do random experiments “work”? (Lecture 27)