U25 363 - Quantitative Political Methods
Exam Two Review

Disclaimer: The following questions are meant to serve as preparation, and are examples of what may appear on the first exam. Do not rely on this content as your sole means of preparation, this is meant to guide your studying.

1 Terms

- Association and Causality
  - Association
  - Time order
  - Direct causal relationship
  - Spurious relationship
  - Chain relationship
  - Multiple causation
  - Direct and indirect causation
  - Treatment/control variables
  - Explanatory/response variables
  - Counterfactual
  - Average Treatment Effect
- Comparing Means and Proportions
  - Dichotomous/binary variable
  - Conditional probabilities
  - Conditional distribution
  - Pooled variance/standard deviation
  - Dependent samples/matched pairs
  - Statistical dependence/independence
  - Contingency table
  - Observed/expected frequency
  - Chi squared distribution
- Regression
  - Linear regression
  - Regression analysis
  - Y-intercept
  - Slope
  - Least squares line
  - Sum of squared error
  - Conditional distribution
  - Conditional standard deviation
  - Unconditional standard deviation
  - Mean squared error/root mean squared error
  - Total sum of squares
  - Correlation coefficient (r/R)

2 Calculate/execute these concepts:

- Comparing Means and Proportions
  - Construct a confidence interval for difference in proportions
  - Construct a confidence interval for difference in means
  - Conduct a hypothesis test for difference in proportions
  - Conduct a hypothesis test for difference in means (large sample)
  - Conduct a hypothesis test for difference in means (small sample)
  - Calculate pooled standard error for means (large sample)
  - Calculate pooled standard error for means (small sample)
  - Calculate a pooled estimate for two proportions
  - Calculate a pooled standard error for two proportions
  - Interpret p-values for differences in means and proportions
  - Calculate expected frequencies for a contingency table
  - Calculate a Chi square statistic
  - Conduct a hypothesis test and interpret the p-value for a Chi square statistic
  - Calculate standardized residuals for a contingency table

- Regression
  - Interpret y-intercept and slope for a linear function
  - Calculate α and β and write a prediction equation
  - Calculate Sum of Squared Errors
  - Calculate Mean Squared Error/ Root Mean Squared Error (conditional variance/standard deviation)
  - Calculate Total Sum of Squares
  - Interpret a scatter plot
  - Construct a confidence interval around β
  - Conduct a hypothesis test for β
  - Calculate standard error for β
  - Calculate S_x and S_y
  - Calculate r and interpret its meaning
  - Calculate r^2/R^2 for linear and multiple regressions and interpret its meaning
  - Calculate unconditional standard deviation
  - Interpret a regression analysis table
  - Write a prediction equation for a multiple regression function
  - Interpret regression coefficients in a multiple regression
  - Interpret the significance of a multiple regression using the F distribution
  - Test an interaction term
  - Interpret a regression line with an interaction term
  - Plot regression lines
  - Interpret error terms in regression equations
  - Interpret residuals plotted together

- Causality
  - Why do experiments help us estimate causal effects
  - Assumptions needed to make causal inference using regression in observational (non-experimental) data