Topic List Exam 2 Econ 300

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The following is intended to cover major topics you should understand for exam 2

Hypothesis Testing

You should be able to

- Set up a hypothesis test and determine whether a coefficient is statistically significant from a p value
- Interpret the meaning of statistical significance
    - Understand the limitations of statistical significance
- Calculate a confidence interval
- Obtain coefficient estimates, standard errors, and p values from R output

Multivariate OLS

You should be able to

- Write the regression equation / estimating equation for a multivariate regression
- Interpret the error term and what is included in it
    - And how this differs in a multivariate regression
- Interpret the intercept and slopes within the context of a multivariate model
    - Including for dummy variables, logarithms, and interaction terms
- Calculate $\hat{y}, \hat{\varepsilon}$ given model parameters
- Calculate slope coefficients in an interacted dummy variable model
- Define bias and give the condition required for estimates to be unbiased (both the definition and the intuition)
    - Understand whether a given scenario would cause bias given a set of controls
    - Determine whether a scenario will cause upward or downward bias
- Understand why we use multivariate OLS and in what cases it is/is not appropriate
    - Understand when multivariate OLS will produce an unbiased result

Important Equations:

- $CI_\alpha = \hat{\beta}_1 \pm z_\alpha se(\hat{\beta}_1)$ Computing Confidence Intervals
- Definition of unbiasedness: $E[\hat{\beta}_1] = \beta_1$
- $y_i = \beta_0 + \beta_1 x_{1i} + \beta_2 x_{2i} + ... + \beta_n z_{ni}$ Multivariate "core model"
- $E[\hat{\beta}_1] = \beta_1 + cor(x, \varepsilon)\frac{\sigma_\epsilon}{\sigma_x}$. Bias formula for bivariate OLS
- $var(\hat{\beta}_1) = \frac{\hat{\sigma}^2}{n\sigma_x^2}$ Sampling variance formula