

[illegible]

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Currently

- Individual t-Tests: *These tests allow us to check the importance of individual predictors **one at a time***
- ANOVA F-Test: *This test allows us to check the overall effectiveness of all the predictors in the model **as a group***
- We Have Seen that the ANOVA F-Test is Equivalent to Testing the Linear Regression Model We Fit Against the Empty Model

Nested F-Test

- Nested Models

Reduced Model: $Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_1 X_2 + \epsilon$

Full Model: $Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_1 X_2 + \beta_4 X_1^2 + \epsilon$

- The Reduced Model is **Nested Inside** the Full Model Since the Full Model **Contains All of the Predictors** that are in the Reduced Model
- We May Want to Test the Hypotheses:
 - $H_0: \beta_4 = 0$ Under Assumption that $\beta_1 \neq \beta_2 \neq \beta_3 \neq 0$
 - $H_a: \beta_4 \neq 0$

Nested F-Test

- Nested F-Test for Testing a Subset of Predictors in Full Model
 - Hypotheses:
$$H_0: \beta_i = 0 \text{ for all predictors in subset}$$
$$H_a: \beta_i \neq 0 \text{ for at least one of predictors in subset}$$
 - Define Full and Reduced Model:
 - Full Model is the Regression Model with All Variables in It
 - Reduced Model is the Model Under the Null Hypotheses
 - The Reduced Model is the Full Model without the Subset of the Predictors that We are Testing

Nested F-Test

- Nested F-Test (Continued)
 - Fit Both Linear Regression Models to Get $SSModel$ and SSE

- Test Statistic:

$$F^* = \frac{(SSModel_{full} - SSModel_{reduced})/(\# \text{ of predictors in subset})}{SSE_{full}/(n - k - 1)}$$

- P-value: Use F-distribution Where the Numerator Degrees of Freedom is the Number of Predictors in Subset and the Denominator Degrees of Freedom is $n-k-1$

Nested F-Test

- Nested F-Test (Continued)
 - Decision: Based Off P-value
 - Interpret in the Context of the Data
- Idea: *We are testing the effectiveness of **adding** the predictors in the subset to the **reduced model** and testing This subset as a group*
- Appropriateness: *Only do this test if you have evidence that the reduced model is good/effective/adequate*

Thank You

Make Reasonable Decisions

