

Stat 328 Course Outline Summer 2004

Session #1

- What is Statistics?
- Basic Descriptive Statistics
 - Graphs for Quantitative Data
 - Histograms (shape, location, spread)
 - Stem Plots
 - Time Plots (trends)
 - Numerical Measures for Quantitative Data
 - Mean, Median
 - Quartiles, 5-Number Summaries, Boxplots
 - Standard Deviation
- "Normal" Distributions/Models

Session #2

- Producing Data
 - Observational Studies and Experiments
 - "Random Sampling" in Observational Studies
- Modeling Randomness/Chance
 - Rules of Probability
 - Applications to Finite Sample Spaces
- Random Variables (and Their Probability Distributions)
 - Discrete Random Variables
 - Continuous Random Variables (Normal the main example)
- "Sampling Distributions"
 - Simulation
 - Theory for \bar{x}
 - Law of Large Numbers
 - Mean and Standard Deviation for \bar{x}
 - Central Limit Theorem

Session #3

- (Fake) Confidence Intervals for a Mean from the Sampling Distribution of \bar{x}
- ((Fake) Prediction Intervals for Another x ... Class Notes)
- (Fake) Significance Tests for a Mean from the Sampling Distribution of \bar{x}

Session #4

- Real Inference for a Mean
- (Real Prediction Intervals for Another x ... Class Notes)
- Real Inference for a Difference in Means

Session #5

- Inference for a Standard Deviation
- Business Process Improvement and Statistics
- Shewhart Control Charts

Session #6

- Exam 1
- Descriptive Statistics for (x,y) Data
 - Least Squares Line
 - Sample Correlation, r
 - Coefficient of Determination, R^2

Session #7

- Cautions/Caveats About Interpretation
- Normal SLR Model
- Estimates in the SLR Model
 - b_0 , b_1 and s_e
- Inference in the SLR Model
 - Confidence intervals for σ
 - Confidence Intervals for β_1
 - Confidence Intervals for $\mu_{y|x}$
 - Prediction Intervals for y_{new}
 - t tests for $\mu_{y|x}$ and β_1
 - F tests for β_1 and ANOVA

Session #8

- Finish SLR Inference
 - F tests for β_1 and ANOVA
- Descriptive Statistics for $(x_1, x_2, \dots, x_k, y)$ Data
 - Least Squares Coefficients $b_0, b_1, b_2, \dots, b_k$
 - R^2
- Normal MLR Model
- Inference in the MLR Model
 - Confidence Intervals for the β_j
 - Confidence Intervals for $\mu_{y|x_1, x_2, \dots, x_k}$
 - Prediction Intervals for y_{new}

Session #9

- More Inference in the MLR Model
 - Confidence Intervals for $\mu_{y|x_1, x_2, \dots, x_k}$
 - Prediction Intervals for y_{new}
 - t tests for the β_j
 - F tests for $H_0: \beta_1 = \beta_2 = \dots = \beta_k = 0$ and ANOVA
 - Partial F tests for $H_0: \beta_{l+1} = \beta_{l+2} = \dots = \beta_k = 0$ and ANOVA
 - Multicollinearity
- Transforming Old and Building New Predictors

Session #10

- Building Responses and Predictors
 - "Interaction"
 - Dummy Variables
- Model Searching
 - Goals/Model Comparison Criteria
 - "Algorithms"
- Model Checking/Diagnostics
 - Residual Plotting
 - Standardized Residuals
 - Deleted Residuals and $PRESS$
 - "Leverage Values" h_{ii} (JMP "hats")
 - Cook's D

Session #11

- ?More Diagnostics?
 - Partial Residuals and JMP "Leverage Plots"
- Time Series Analysis Methods