

Stat 328 Course Outline Summer 2002

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 (including Mean and Variance ... Dielman 2.3)
 - 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

- Normal SLR Model
- Estimates in the SLR Model
 - b_0 , b_1 and s_e
- Inference in the SLR Model
 - Confidence intervals for \boldsymbol{s}
 - Confidence Intervals for \boldsymbol{b}_1
 - Confidence Intervals for $\boldsymbol{m}_{y|x}$
 - Prediction Intervals for y_{new}
 - t tests for $\boldsymbol{m}_{y|x}$ and \boldsymbol{b}_1
 - F tests for \boldsymbol{b}_1 and ANOVA

Session #8

- 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 \mathbf{b}_j
 - Confidence Intervals for $\mathbf{m}_{y|x_1, x_2, \dots, x_k}$
 - Prediction Intervals for y_{new}
 - t tests for the \mathbf{b}_j

Session #9

- More Inference in the MLR Model
 - F tests for $H_0: \mathbf{b}_1 = \mathbf{b}_2 = \dots = \mathbf{b}_k = 0$ and ANOVA
 - Partial F tests for $H_0: \mathbf{b}_{l+1} = \mathbf{b}_{l+2} = \dots = \mathbf{b}_k = 0$ and ANOVA
 - Multicollinearity
 - Inference for Linear Combinations, L , of the \mathbf{b}_j
 - Time Series Ideas and Regression
- Transforming Old and Building New Predictors

Session #10

- Regression Diagnostics
 - Residual Plotting
 - Standardized Residuals
 - Deleted Residuals and *PRESS*
 - Partial Residuals and JMP "Leverage Plots"
 - "Leverage Values" h_{ii} (JMP "hats")
 - Cook's D
- Dummy/Indicator Variables

Session #11

- Model Comparison Criteria
 - R^2 , *MSE*, Mallow's C_p , Akaike's *AIC*
 - *PRESS*
- Model Search Algorithms
 - All Possible Regressions
 - Forward, Backward, and Step-wise Selection