ERSH 8310
Final Examination – Due Tuesday, December 11th at 11:59:59 PM

This final consists of two problems:

1. Data analysis of crash test dummy data set.
2. Critique of peer-reviewed journal article's statistical methods section.

The crash dummy data set is the result of a study conducted by the National Transportation Safety Board, as described on the following pages. Along with a description of this study you will find a set of questions posed by the NTSB prior to collecting the data. These questions are not directly statistical in nature, in that they do not ask for specific analyses to be run. They are, however, the questions that drove the research, and resulted in the data that was collected. Each question can be answered using statistical tools taught in this course. Note that there is not necessarily a single best way to answer each question. Furthermore, note that this final, like the midterm, is the statistical equivalent to an essay test, with answers evaluated not only for technical correctness, but also for the motivating reasons for using the statistical methodology.

Directions:
Your job is to answer the questions given for the NTSB data set using statistical techniques you have learned in this class. For **each part of each** question:

- Describe the analysis you have selected to perform (for example, explain why you are using the variables you are using).
- Describe the assumptions of the analysis.
- Report any diagnostic tests of assumptions you may have run.
- Perform the analysis and report the results. Supplying graphs can be helpful to describe your findings.
- Interpret the results.
- Provide an answer to the question using the statistical evidence you have gained via the analysis.
- Describe any limitations of the analysis you performed.
- Remember: direct tabular output from SPSS is not allowed (and will lead to zero points on that section of the analysis); however graphs and figures are encouraged.
- NOTE: Because of logistics, please post your questions to WebCT's discussion board rather than email them to me – this will help others and will allow for communication to flow easier while I am away.

Scoring:
Each data set will represent 1/2 of the total score for the final. For question in the midterm, your score will depend upon these factors:

- Did you choose an analysis that will provide an accurate answer to the question? (10 points)
- Did you explicitly state all assumptions? (20 points)
- Did you perform the appropriate analysis correctly? (30 points)
- Were your interpretations consistent with the information the analysis provides? (30 points)
- Were your conclusions well explained (how well did you use the statistical evidence to create an answer to the question)? (10 points)
- BONUS: One percentage point per WebCT discussion post: either a question or an answer (up to 5% of your total grade).

Problem #1
Crash Test Dummies

Stock automobiles containing dummies in the driver and front passenger seats crashed into a wall at 35 miles per hour. National Transportation Safety Board officials collected information about how the crash adversely affected the dummies. The injury variable is a composite of the extent of head injuries, chest deceleration, and left and right femur load. The data file also contains information on the type and safety features of each crashed car.

Variables:

1. make: Car make
2. Model: Model of that car
3. D/P: Whether the dummy is in the Driver or Passenger seat
4. Protection: Kind of protection (seat belt, air bag, etc.)
5. Doors: Number of doors on the car
6. Wt: Weight of car in pounds
7. Size: A categorical variable to classify the cars to a type (light, minivan)
8. Injuryfac: Dummy injury factor – higher values indicate more severe injury to crash test dummy.

The NTSB has several questions:

- Are there significant differences between the types of protection available in cars?
    - If so, which protection type has the lowest injury factor?
- What variables need to be controlled for when considering which protection type is best?
- Which vehicle types have the lowest injury factor?

Please limit the text of your answer to 10 double-spaced pages or less. Place all tables and figures (if any) following the text. Please do not give SPSS output tables only.

Problem #2
Critique of a Published Journal Article's Statistical Methods

For this problem, select an article from a peer-reviewed journal that you are familiar with (something from your field of study). Be sure to select an article that uses statistical methodology taught in this course. Provide a critique of the statistical methods used in the article. Your response should address the following:

- The full citation for the article (i.e., journal, author(s), title, etc…)
- The empirical research question being investigated by the article.
- A brief description of the research design/data collection methods.
- A description of the statistical methods used to analyze the data (and the assumptions underlying the methods).
- The conclusions drawn as a result of the statistical analyses.
- Your opinion of whether or not the statistical results provided justification for the conclusions drawn by the authors.
- Your opinion of the appropriateness of the statistical methods used in the article.
- What you would change about the analysis and/or conclusions.
- What relevant statistical information was omitted?
- What included statistical information was superfluous?

Please limit the text of your answer to 10 double-spaced pages or less. Place all tables and figures (if any) following the text.