BUS 735: Business Decision Making and Research
Instructor: Dr. James Murray
Fall 2012
Take Home Exam 1

Directions: Type up answers to all of the following questions. Include in your document only the relevant SPSS output that you need to answer the question. Please copy and paste this SPSS output; do not include in your submission any other files except a single Microsoft Word document or PDF document that includes all your answers with the relevant SPSS output accompanying each answer. Every time you conduct a hypothesis test, indicate what statistical test you are using, what are the null and alternative hypotheses, what is your p-value, and a plain English description of what is your conclusion. **Exam is due on Thursday, October 31 by 11:59pm**.

1. The dataset `salesrev.sav` contains the monthly sales revenue (in thousands of dollars) for 200 sales people for a large national corporation. The sales people focus on one of two categories of products, which are labeled as Product 1 and Product 2 in the dataset. Also included in the dataset is the years of experience each sales person has. The company introduces a new sales person training program. The training program involves three full day training sessions, one training session is offered each month for three months. The 200 sales people participate in the training program, and the company gathers data on the monthly sales before the training (`Sales0`), after the first training session (`Sales1`), after the second training session (`Sales2`), and after the third and final training session (`Sales3`). For the following questions, test the appropriate hypothesis and report your conclusion.

   (a) Taking into account the effects that product type and years experience have on sales revenue, is there evidence that the training program positive influences sales?

   (b) Do all of the training sessions lead to an increase in sales revenue, taking into account the effects that product product type and years experience have on sales revenue? If not, which training sessions do you find evidence that are effective, and which training sessions do you fail to find evidence that they are effective?

   (c) Taking into account the effect of training and years experience, is there a difference in sales revenue between sales people who sell Product 1 versus Product 2?

   (d) Taking into account the effect of training and product type, does years experience influence sales revenue?

   (e) Taking into account the effect of years experience, is the effect that training sessions have on sales revenue different for product 1 versus product 2?

   (f) Taking into account the effect that product type has on sales revenue, does the effect that training sessions have on sales revenue depend on years experience?

2. The dataset `wage1D.sav` contains the following variables including wage and background information for 526 individuals:

   - `wage`: average hourly earnings
   - `educ`: years of education
   - `exper`: years of experience
   - `tenure`: years with current employer
   - `nonwhite`: Dummy variable = 1 if employee is non-white.
   - `female`: Dummy variable = 1 if employee is female.

   (a) Estimate a regression that explains average hourly earnings using all the variables in the dataset. What is your estimated regression equation?

   (b) What percentage of the variability in average hourly earnings is explained by education, experience with employer, total experience, race, and gender?

   (c) Accounting for the other variables in the model, is there evidence that non-white employees receive lower wages on average than white employees? If so, what is the estimated difference in hourly earnings between someone who is white and non-white?

   (d) Accounting for the other variables in the model, is there evidence that more education leads to an increase in average hourly earnings? If so, what is the estimated difference in average hourly earnings between someone who has 12 years of education, and someone who has 16 years of education?

   (e) What is the predicted wage for a non-white male with 15 years of education, 6 years of experience, and 1 year experience with his current employer?

3. The dataset `cps.sav` contains information about union membership and background characteristics for 1084 individuals. The variables include,

   - `educ`: years of education
   - `south`: dummy variable = 1 if employee lives in the South
   - `nonwhite`: dummy variable = 1 if employee is not white
   - `female`: dummy variable = 1 if employee is female
   - `exper`: years of experience
   - `y85`: dummy variable = 1 if year of the observation is 1985, = 0 if the year of the observation is 1978
   - `union`: dummy variable = 1 if the employee is a member of a labor union.

   (a) Estimate a regression that predicts the probability that a person is a member of a union based on all the other variables given above. What is your estimated regression equation?

   (b) Is there evidence that males and females have different propensities to be a member of a union, given the other variables in your model? If so, which gender is more likely to be a member of a union?

   (c) Use your regression model to predict the probability that a white woman from Wisconsin with 12 years of education and 12 years of experience was a member of a union in 1985.

   (d) What is the marginal effect on the probability of union membership for living in the South, for a person similar to the one described in the previous question?