PSYC 943: Fundamentals of Multivariate Modeling
Homework #5 (Total 10 Points)
Due: Friday, October 11, 2013 at 12pm.

This assignment uses data from the iris flower data set (see information here: http://en.wikipedia.org/wiki/Iris_flower_data_set). The data are of four measurements from 150 observations of three species of irises. Use the first four variables (Sepal Length, Sepal Width, Petal Length, and Petal Width) to answer the following questions.

Use Maximum Likelihood to estimate the following models:

1. Estimate a saturated means (the mean for every variable is estimated) and independent variables model (a common variance for all items and zero covariance for all item pairs).
2. Estimate a saturated means and compound-symmetric covariance model (a common variance for all items and a common covariance for all item pairs).
3. Estimate a saturated means and unstructured covariance model (i.e., a unique variance for every item and unique covariance for all item pairs).
4. Estimate a common means (all variables are estimated to have the same mean) and unstructured covariance model (i.e., a unique variance for every item and unique covariance for all item pairs).

Homework Problems:

1. What is the estimate and standard error of the common variance from Model #1? (.5 points)
2. What is the estimate and the standard error of the common variance from Model #2? (.5 points)
3. What is the estimate and the standard error of the common covariance from Model #2? (1 point)
4. Conduct a likelihood ratio test comparing Model #1 and Model #2. What is the test statistic, degrees of freedom, and p-value? Based on this result, what model do you select from these two? (1 point)
5. What is the estimate and the standard error for all 15 parameters in the covariance matrix from Model #3? (1 point)
6. Compare the estimates of the means for all three models. Do they change? Why or why not? (1 point)
7. Conduct a likelihood ratio test comparing Model #2 and Model #3. What is the test statistic, degrees of freedom, and p-value? Based on this result, what model do you select from these two? (1 point)
8. What is the estimate and standard error of the common mean from Model #4? (1 point)
9. Conduct a likelihood ratio test comparing Model #3 and Model #4. What is the test statistic, degrees of freedom, and p-value? Based on this result, what model do you select from these two? (1 point)

Automated LRTs creation:

10. Create an Excel spreadsheet, a SAS Macro, or some other automated routine that calculates the likelihood ratio test statistic and p-value under ML. Note: You may use other resources to construct yours, but may not copy directly. (2 points)

Submission Instructions:

All homework and final answers must be your own and not be copied or paraphrased from anyone else's answers. Homework must be submitted via email (jtemplin@unl.edu) in the form of Microsoft Word document with the name: 943_FirstLast_HW#.docx. Late homework will have a penalty of 10% per calendar day.