MS COMPREHENSIVE EXAM
Stat 505-506 Take Home

80 points   Start Date: *August 18, 2015*

Instructions: Do this exam on your own. You may use any notes and books and may check internet resources, but don't discuss the exam with anyone except Jim Robison-Cox. Bring any questions to him in person or via email. Turn in your writeup to his email by noon on Wednesday, August 19, 2015.

Read this article:

`http://www.math.montana.edu/~jimrc/MScomp/quailArticle.pdf`

and answer the following questions based on the data provided.

The Data:

`http://www.math.montana.edu/~jimrc/MScomp/quailMorph.csv` and

http://www.math.montana.edu/ jimrc/MScomp/quailTemps.csv

The first file contains morphological measurements they used to create Figure 1. The three bill measurements have been logged and combined to obtain just the first principal component which we will use as a measurement of overall bill size.

1. In 3(a) they report an $F_{21,691} = 4422.83$ for $\log_{10}(mass)$. as an indication that birds gained mass throughout the time course of the experiment. That is not exactly what the F test is testing. Obtain a test with those degrees of freedom, explain what it is testing and report the results.   (10 pts)

2. Use bill size (`bill_pc1`) as response and look at the time period from days 5 to 51. Provide a complete description of bill growth over time for this time period. Consider all possible contributions to differences in growth rate including sex, treatment, and individual differences. Is a time series correlation structure needed? Include diagnostic information.   (30 pts)

3. What is the scope of inference for your conclusions?   (10 pts)

4. At the end of Section 2 they talk about a bird with a wet beak. Do you agree with removal of this data point? why or why not?   (10 pts)

5. Discuss the analysis shown in Figure 2. Would you include another interaction? Rerun the analysis your way and report the results.   (20 pts)

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