Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

EDUC 880 Midterm

Fall 2019

Complete the analyses requested below. Please construct and turn in along with your exam the items in **boldface**. Answer all questions. Include any code and output you think necessary for me to understand what you did.

1. (10 pts) I would like you to run a *2 group x 4 time* repeated measures ANOVA on the dependent variable husbands’ marital adjustment (HMADJ1, HMADJ2, HMADJ3, HMADJ4), where a high score is better. Use the seven error structures that we discussed in class. Assume equal spacing of the repeated measures. Make sure to pick the best error structure. **Table** the AIC and BIC for each error structure you try. The data are in the file, famdata1.nomiss.dat. The data can be read by the SAS program, madjust.midterm.sas. For R the data with header are in the file, famdata1.midterm.forR.dat.

A. **Table the** **ANOVA** results for the omnibus tests for the model with the best error structure. **Table the parameters** from the error structure. **Table the means** (main effects and interaction means).

B. What do you conclude regarding differences among the means based on the above table? Which effects are significant? Which would you follow up?

C. Depending on the results of the omnibus tests, use followup contrasts to better describe how the means are different.

For your contrasts I would like you to use polynomial contrast coefficients for the 4 occasion time effect in your followup contrasts:

Time 1 Time 2 Time 3 Time 4

Linear -3 -1 1 3

Quadratic 1 -1 -1 1

Cubic -1 3 -3 1

Remember that you can apply these coefficients to the time effect regardless of whether you follow up a main effect for time or an interaction effect including time.

**Table** the contrast results.

What do you conclude?

2. (10 pts) Fit a straight line growth curve model through the same data also assuming equal spacing.

**Table** you results

Compare these results to the results for the linear trend with equal spacing above. What do you conclude? Do you two methods agree or differ?

3. (10 pts.) I’ve included 16 cases of cow growth data (5 occasions of weight gain) along with a grouping variable that indicates whether or not the cow is ill. The program to read these data (along with the data) is located in the file, cow.sas. You also have the data with a header, cowdata.forR.dat that can be used in R. Remember that the dependent variable which is measured on five equally spaced occasions is the scaled log of the cow’s weight. The log of the true cow weight over this period follows a curve. We’ve looked at growth curves and repeated measures ANOVA in class. I would like you to use repeated measures ANOVA to model these data. Followup the omnibus test using the complete set of polynomial contrasts coefficients (linear, quadratic, cubic, and quartic) for 5 occasions of data (available in the file, Handouts first 3 weeks.pdf) to identify how the means are different. **Compare the results** obtained through the contrasts to what you would have learned if you had only looked at the ANOVA omnibus tests. **Table the omnibus tests and the contrast results** (you can cut and paste to do this). **Table the means and plot the means for the two groups**.

For the omnibus test you should be completing the following steps:

(1) **Table** the means

(2) **Select the error structure** (describe briefly how you made this selection)

(3) Run the analysis with the best error structure and **table the results** including the covariance matrix of the residuals and the Type III F-tests for each of the effects.

For the contrasts use the best error structure from above. Run the contrasts making sure that you select the correct degrees of freedom for each contrast. You need the omnibus test results to get these. Remember what the default df will be. For some of the contrasts you may have to change from the default. What do the ANOVA contrasts tell you about how the cows are changing?

4. (10 pts) Use a different set of contrasts to determine at what point sick cows diverge from healthy cows in terms of their weight gain. Use the following contrasts:

1) Is the difference between occasions 1 and 2 for healthy cows different than the different for the same two occasions for sick cows.

2) Repeat the test for occasions 1 and 3

3) Repeat the test for occasions 1 and 4

4) Repeat the test for occasions 1 and 5

**Table** your results.

What do you conclude?

5. (10 pts) For the cow data, fit a quadratic growth curve model. That means that your model should include:

grp time grp\*time time^2 grp\*time^2

Select among the following error structures:

Intercept only

Intercept time

Intercept time time^2

Intercept time^2

**Plot** the curve for each group.

**Table** your results.

What do you conclude?