Statistics 5200 Fall 2020 Homework 3

Assignment Due (by 11:59 P.M.): Wed 14 Oct

Directions: You may discuss the exercises with other students and with the instructor, but the work you turn in must be your own. Note that neatness and format (including SAS code in appendix) will contribute 10 points to the total score. This assignment will be graded out of 80 points. Numerical checks: R-square in 1a is 0.4512, and in 3a is 0.9519.

Exercises:

1. (30 points) Textbook Exercise 6.3, page 144 (anesthetized guinea pigs). HW3 in Canvas has a link to necessary pages.

   (a) Without transforming the data, fit a one-way ANOVA model using PROC GLM, and report (by number) the following parts: (i) p-value (and corresponding conclusion in the context of this application) for the null hypothesis that all treatment means are equal, (ii) evidence regarding appropriateness of relevant assumptions, and (iii) results of all pairwise treatment comparisons while appropriately accounting for multiple testing (copying and pasting some short SAS output is appropriate here, along with a brief interpretation of which pairs of treatments are significantly different).

   (b) After making the transformation recommended by Box-Cox, re-fit the model and report the same parts (i)-(iii) as in (1a) above.

   (c) Briefly compare your results in (1a) and (1b) above. Which model would you recommend, and why?

   (d) Which treatment(s) (of the four) would you recommend as being most effective, and why?

2. (15 points) Textbook Exercise 6.5, page 145. HW3 in Canvas has a link to the necessary pages. Respond to this exercise exactly as it appears in the text. You can just think of Studentized residuals as re-scaled residuals, and Rankits are related to normal quantiles.

3. (25 points) Based on textbook Problem 6.1, page 147 (quack grass and big bluestem). Here, treat this experiment as using six treatments (coded 1N, 1Y, 2N, 3N, 4N, and 4Y).

   (a) Follow the same instructions as for (1a) above, reporting parts (i)-(iii).

   (b) Test for an irrigation effect by using an appropriate contrast based on treatments 1Y, 4Y, 1N, and 4N. (Define a contrast ψ using appropriate coefficients for all six treatments [some may have coefficient 0], and test $H_0 : \psi = 0$.) Report (i) the contrast you defined in terms of these treatments, (ii) the F-statistic and p-value reported by SAS, and (iii) your conclusion in the context of this application.

   (c) Which treatment(s) (of the six) would you recommend to reduce quack grass invasion, and why?

Appendix: (10 points) Include SAS code used for this assignment.