Agronomy 526 Homework

Due: 4/14/22

1. A field trial was conducted over a period of 12 years to assess the effects of growing sugar beet in rotation with other crops. The rotations were II) Potato-Sugarbeet, III) Potato-Sugarbeet-Wheat, and IV) Potato-Wheat-Sugarbeet-Wheat. The experiment was designed as a randomized complete block with two complete blocks. Treatments consisted of every phase of the three crop rotations, but for the purpose of this analysis only sugarbeet yield (Mg/ha) is being considered. Therefore, only data from the sugarbeet phase of each rotation is included in the dataset (hw25.xls).

Block	1			2		
Rotation	II	III	IV	II	III	IV
Year						
77	54.01	46.62	51.91	51.51	57.92	52.33
79	60.03	64.6	54.17	62.63	56.91	60.27
80	70.28	58.86	60.6	76.3	61.43	67.97
81	71.2	73.05	69.84	74.36	77.94	72.93
82	69.61	71.49	72.56	73.53	78.11	70.5
83	40.15	47.26	66.88	37.72	66.34	72.9
85	60.83	52.15	53.04	55.5	59.98	56.03
86	59.74	57.86	58.94	61.16	47.87	59.72
87	70.33	62.39	79.26	71.37	67.32	72.58
88	49.84	55.86	63.62	49.59	55.14	65.43

   a. Write the linear additive model and expected mean squares for the experiment.

   b. Perform the analysis of variance using PROC MIXED.

   c. Slice the Rotation x Year means.

   d. Plot the Rotation x Year means and interpret the graph.

   e. Multiple observations (years) were made on the same experimental units (plot) although the frequency varied among rotations. Would you expect an issue with the independence assumption in conducing the ANOVA for this study?

   * turn in your SAS program as well as output

The data for this assignment were adapted from an example developed by Roger Payne. The experiment is described in more detail in Chapter 11: The Design and Analysis of Long-term Rotation Experiments of **Applied Statistics in Agricultural, Biological, and Environmental Sciences** (2018) which is assigned reading for this topic.