**SP/RM[1,1] – Using Software**

**Type in your score here 🡪 \_\_\_\_ out of 30 points possible**

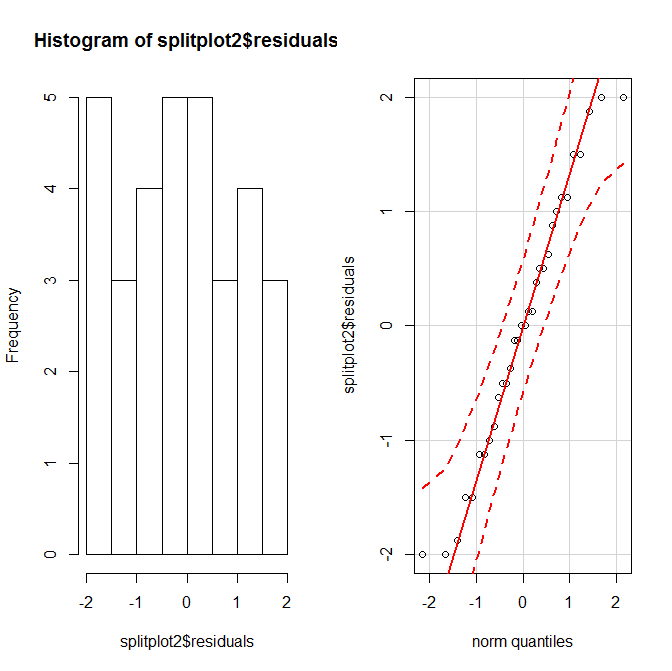
1. (5 points) Ponder/Reflect Exercise – Reflect on what you have learned from this portion of the class. Examples of what you can do are: a brief outline of material covered, insights you gained from class or personal study, or items you feel that you need to follow up or work on. (3-5 sentences)

The split plot and repeated measures experiment design is very powerful when dealing with treatments you want applied to every factor level. This is better then just trying to block on certain nuisance factors. When analyzing it’s great to look at the interaction first before you look at main effects.

2. Consider the experiment described in Example 7.11 on page 261, with data given on the bottom of page 281.

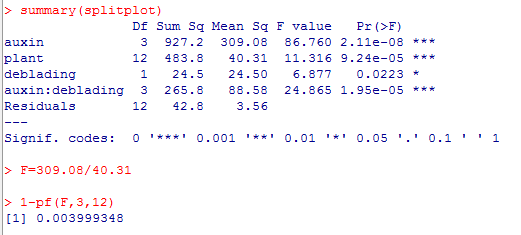
(a) Using the file auxin.csv on the homework page, run the analysis to check your work from the decomposition homework. Discuss the results of the experiment, including the significance or non-significance of each hypothesis test of interest (i.e., discuss the test for each factor). For the auxin data, answer the following questions:

1. (5 points) Check the assumption of residuals being normally distributed using **software**.



It appears that the residuals are normal. We are probably OK going forward with this test.

1. (4 points) Get an ANOVA table using **software**



1. (8 points) For the effect of interest: i) state the null and alternative hypotheses, ii) give the test statistic, iii) give the degrees of freedom, iv) state the p-value, v) determine whether you should reject or not reject the null hypothesis, and vi) write a sentence which gives an appropriate conclusion.

Ho: µA1= µA2 = µA3 = µA4 Ha: at least one of the population means is

2. Test Statistic F=358.450

3. Degrees of Freedom Num df=3 Den df=12

4. P-value = 0.004

5. Since the p-value is less than 0.05, we would reject the null hypothesis

6. Therefore, we have sufficient evidence that at least one of the population means is different

Deblading

1. Ho: µDB1= µDB2 Ha: at least one of the population means is different (µDB1 ≠ µDB2 )

2. Test Statistic F= 6.877

3. Degrees of Freedom Num df=3 Den df=12

4. P-value = 0.022

5. Since the p-value is less than 0.05, we would reject the null hypothesis

6. Therefore, we have sufficient evidence that at least one of the population means is different

Interaction

1. Ho: There is no interaction between Deblading and Auxin Ha: There is an interaction

2. Test Statistic F = 24.865

3. Degrees of Freedom Num df=3 Den df=12

4. P-value = Close to Zero

5. Since the p-value is LESS than 0.05, we would reject the null hypothesis

6. Therefore, we have sufficient evidence that there is an interaction between Deblading and Auxin

1. (1 point) What is the response variable?

The number of days after deblading before the leaf pair falls off.

1. (1 point) What are the experimental factors and what are the levels for each?

Auxin – Control, Lanolin, Low Auxin, High Auxin

Deblading – Yes No

1. (1 point) What blocking used in this study? If so, what are the blocks?

Yes, The 16 plants

1. What is the statistical model for the observed values, defining all symbols used? (2 points)

1. What are the null and alternative hypotheses using the model in problem vii? (3 points)

For the auxin:

For the deblading:

For the interaction:

It appears that we would reject the null hypotheses of the interaction; which means the effect of auxin depends on whether a plant was debladed (and vice versa). In the presence of a significant interaction the main effects for auxin and deblading should not be interpreted; at least, not until we do more investigation.