

Week4 - Assignment

M. Onimus

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Read in Data

Question 1

Chichi and David are still working on their study of what children are eating for lunch at school. In the BasicTests School.sav file are 8 random samples of meals from 3 schools (hence 24 observations total). The data represents fat content in grams from meals served at the schools. The two are interested in whether there is a difference in fat content of the lunches between schools. Please test that hypothesis using an ANOVA.

Question/Answer 1a

What are the null and alternative hypotheses?

H₀: $\mu_1 = \mu_2, \mu_1 = \mu_3, \mu_2 = \mu_3$

H_A: $\mu_i \neq \mu_m$ for some $i \neq m$

Question/Answer 1b

What is the average fat content in the lunches of each of the schools?

School	mean
1	138.125
2	135.000
3	141.000

The mean fat content of school 1 is 138.125, school 2 is 135, and school 3 is 141.

Question/Answer 1c

What is the test statistic? What are the degrees of freedom?

Analysis of Variance Table					
	Df	Sum Sq	Mean Sq	F value	Pr(>F)
School	2	144.1	72.04	0.8354	0.4476
Residuals	21	1811	86.23	NA	NA

The F-value test statistics is 0.8354387 and the degrees of freedom are 2.

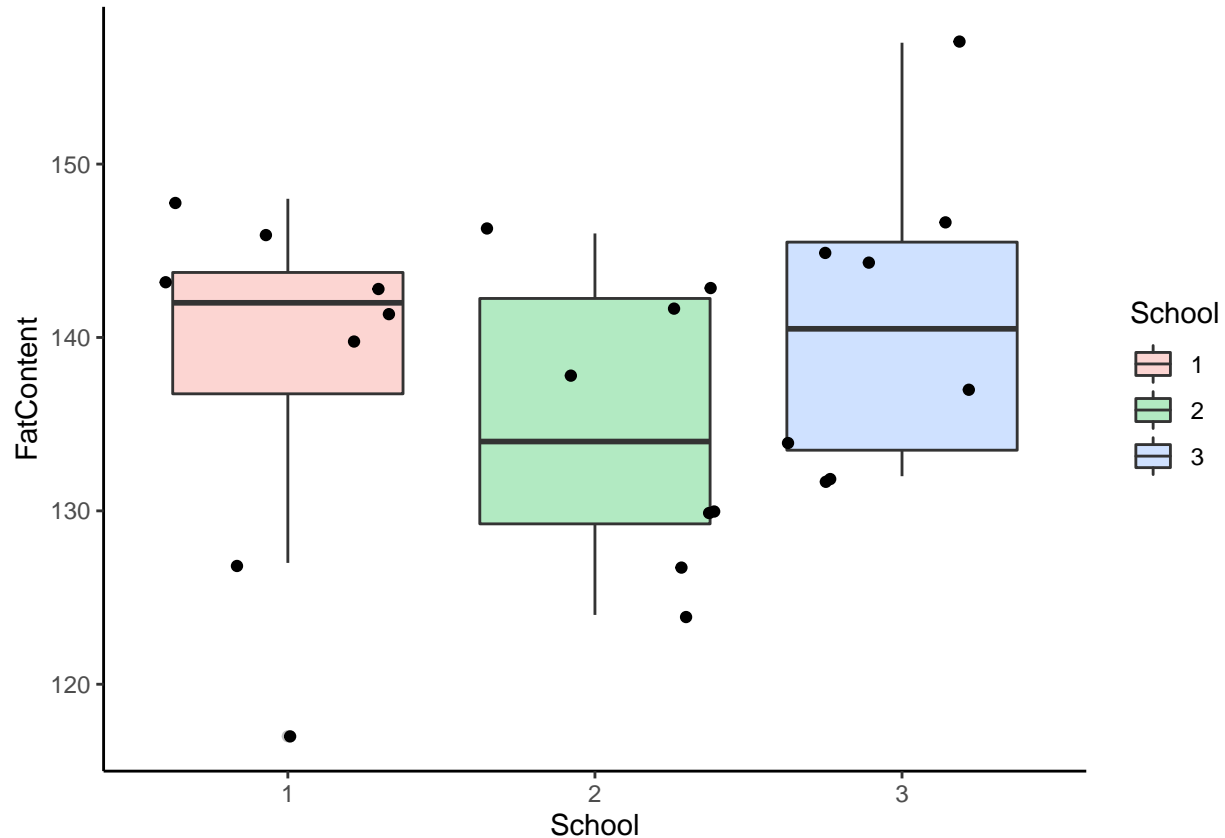
Question/Answer 1d

What is the p-value associated with that test statistic?

The associated p -value with the test statistic is 0.4475949.

Question/Answer 1e

What can you say about the model assumption of homogeneous variances between groups? Please include any relevant plots or descriptive/inferential statistics as appropriate to support your discussion.



The Levene F-value test statistic from the Levene test was 0.0109091 with a corresponding p -value of 0.9891558. Indicating we can assume consistent variance. This is also demonstrated by the boxplot showing the distribution for each school is approximately the same.

NOTE: these results are different from what is produced in SAS and I am not sure why yet.

Question/Answer 1f

Are post-hoc tests appropriate? If so, please report on which schools differ in fat content, using a Bonferroni correction.

```
## # A tibble: 3 x 9
##   .y.      group1 group2    n1    n2    p p.signif p.adj p.adj.signif
## * <chr>      <chr>  <chr>  <int> <int> <dbl> <chr>      <dbl> <chr>
## 1 FatContent 1      2      8     8 0.508 ns        1      ns
## 2 FatContent 1      3      8     8 0.542 ns        1      ns
## 3 FatContent 2      3      8     8 0.21  ns       0.631 ns
```

The p -value of 0.4475949 from the ANOVA indicated that no group was significantly different; an post-hoc analysis may not be needed as we have answered the main question already. As a practice, I have completed a pairwise t test regardless. As the ANOVA indicated, there is no significant differences between any school in terms of fat content.

Question/Answer 1g

Write up your interpretation of the results of your analysis.

In this study of what children are eating for lunch at school, we observed no significant differences between the fat content of 3 different schools (F-value = 0.8354387, p -value of 0.4475949).
