Multiple Comparison Procedures To A Control

For AN(C)OVA Models

Statsomat.com Contributors*

14 Juni 2021

Contents

*Denise Welsch, Markus Neuhäuser, Viktoria Daum, Linda Müller, Damian Nink, Simone Schüttler, Daniela Wüller

Basic Information

Automatic statistics for the file:

File
litter.csv

Your selection for the encoding: UTF-8
Your selection for the decimal character: .
Observations (rows with at least one non-missing value): 74
Variables (columns with at least one non-missing value): 4
Variables considered continuous: 2

Variables considered continuous
weight
number

Variables considered categorical: 2

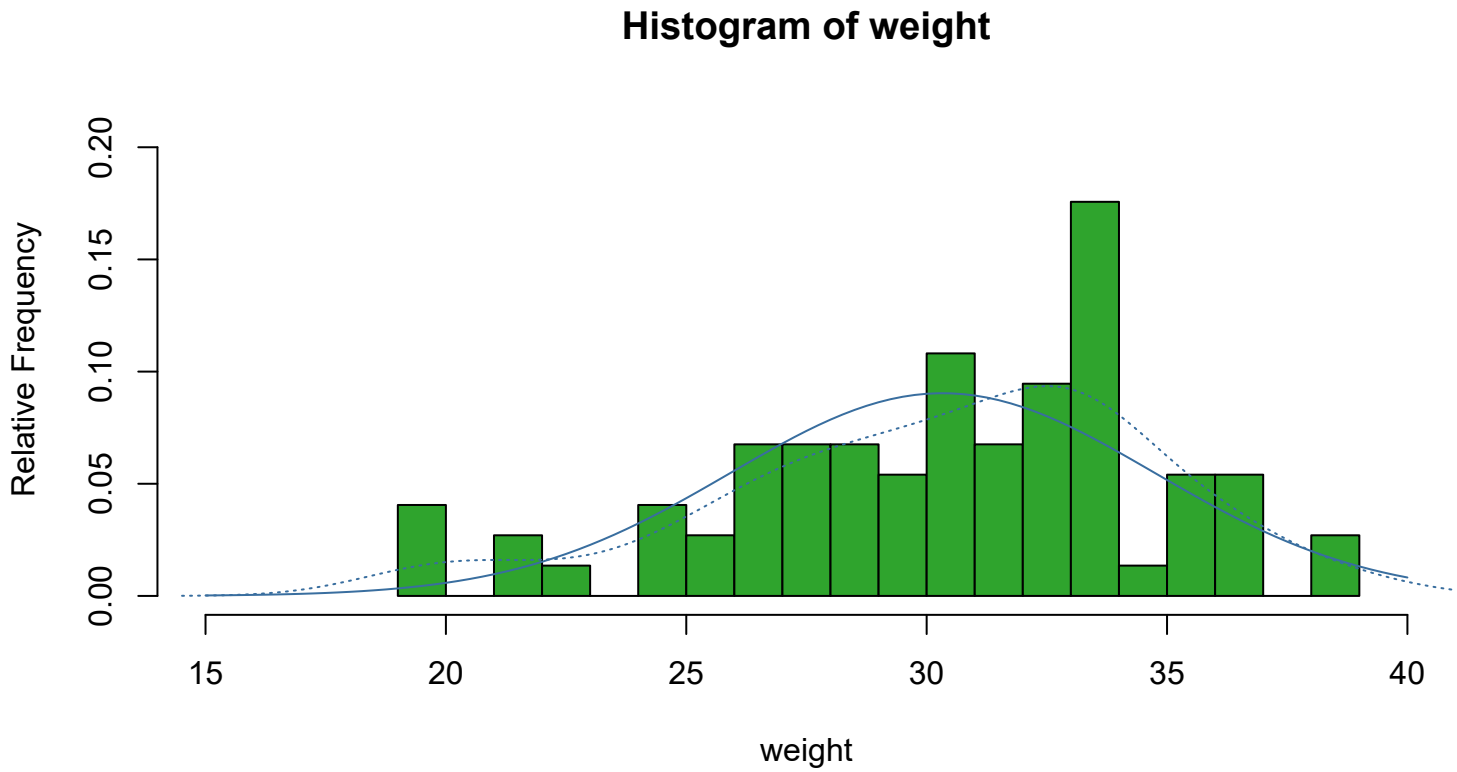
Variables considered categorical
dose
gesttime

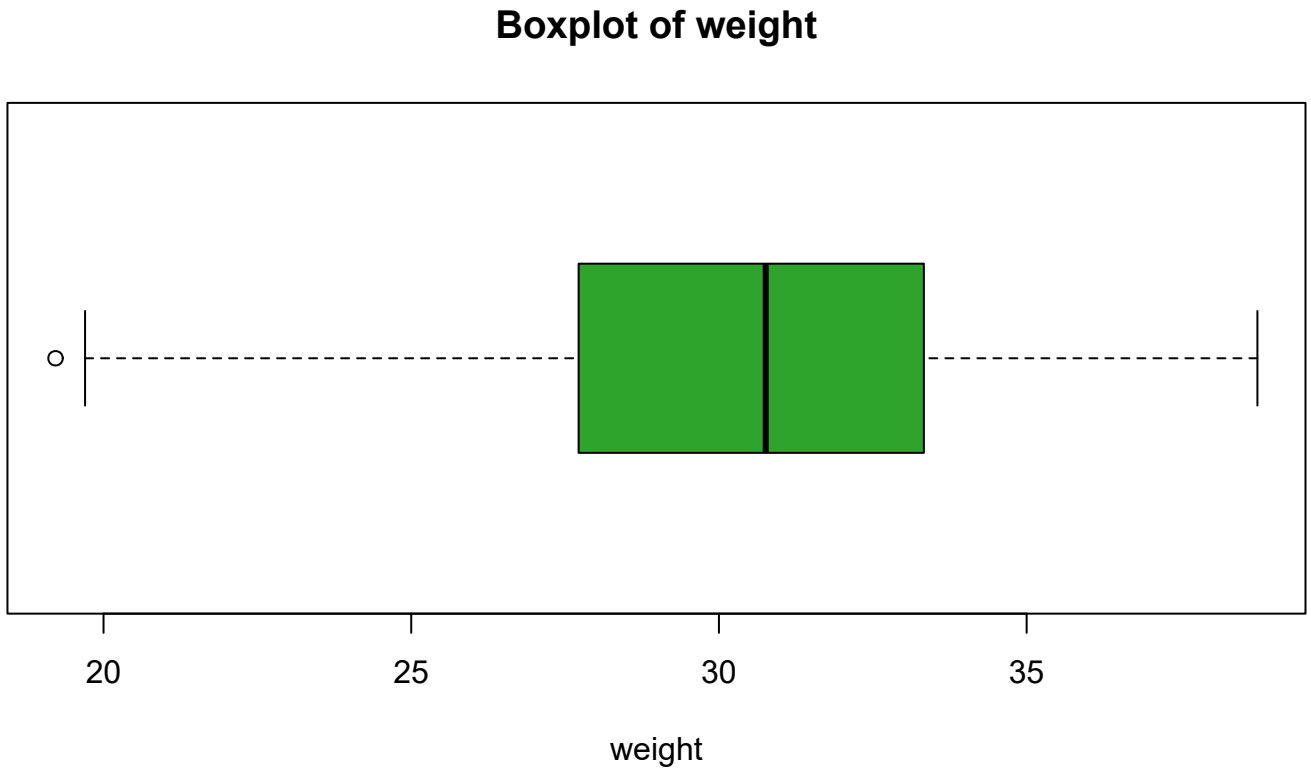
Model Information

You defined the following linear model: weight~dose+gesttime+number
You are interested in the factor: dose
You are interested in pairwise comparisons to the control factor level: 0

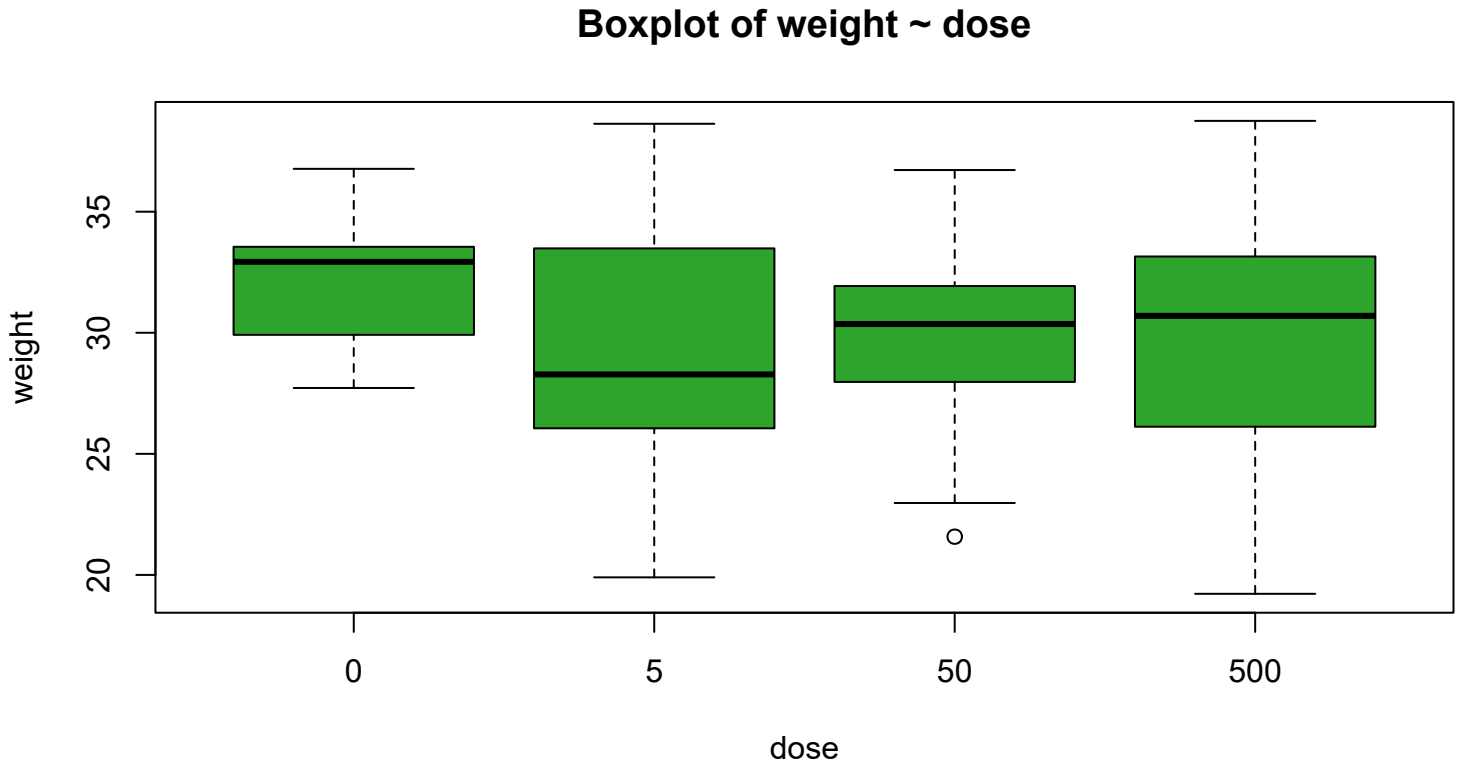
Descriptive Plots

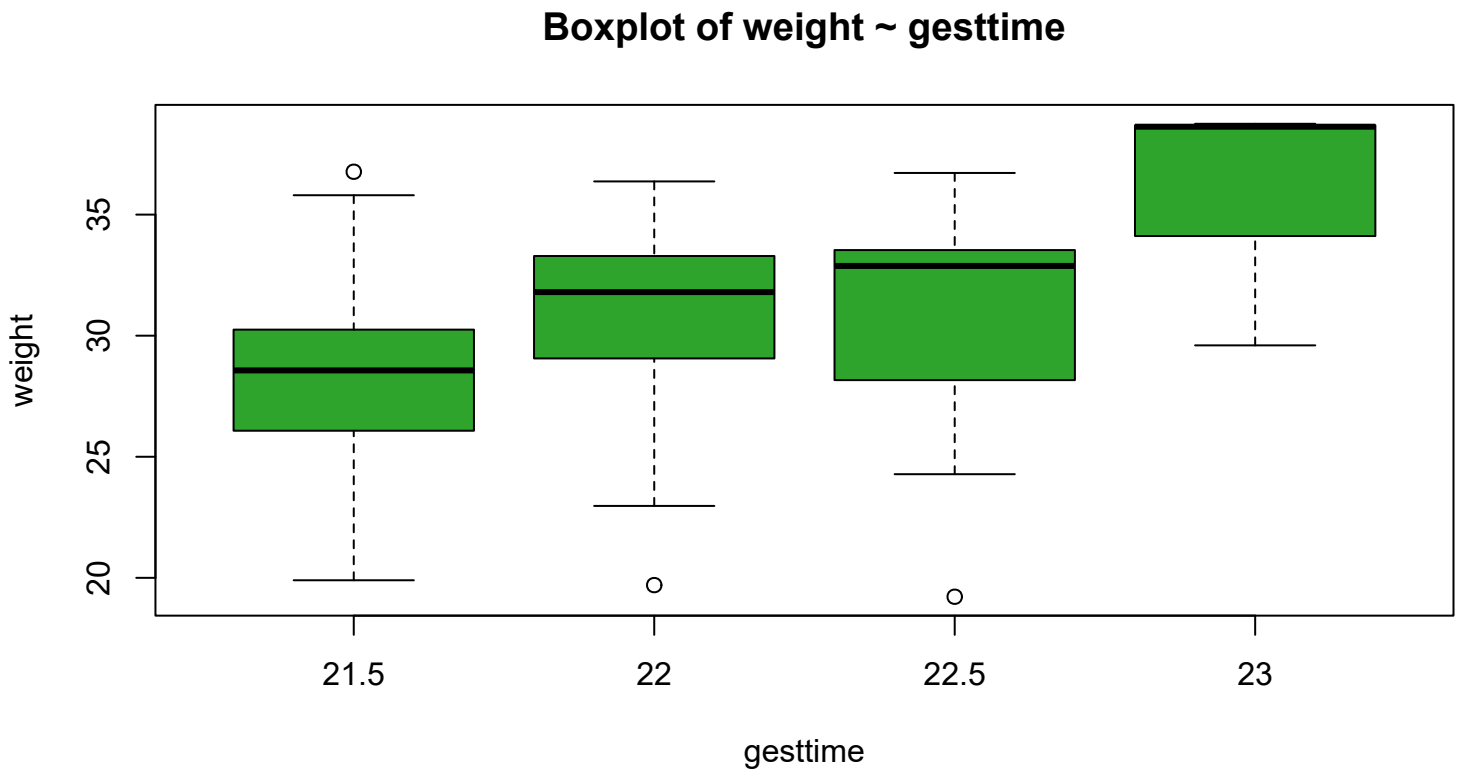
Dependent Variable



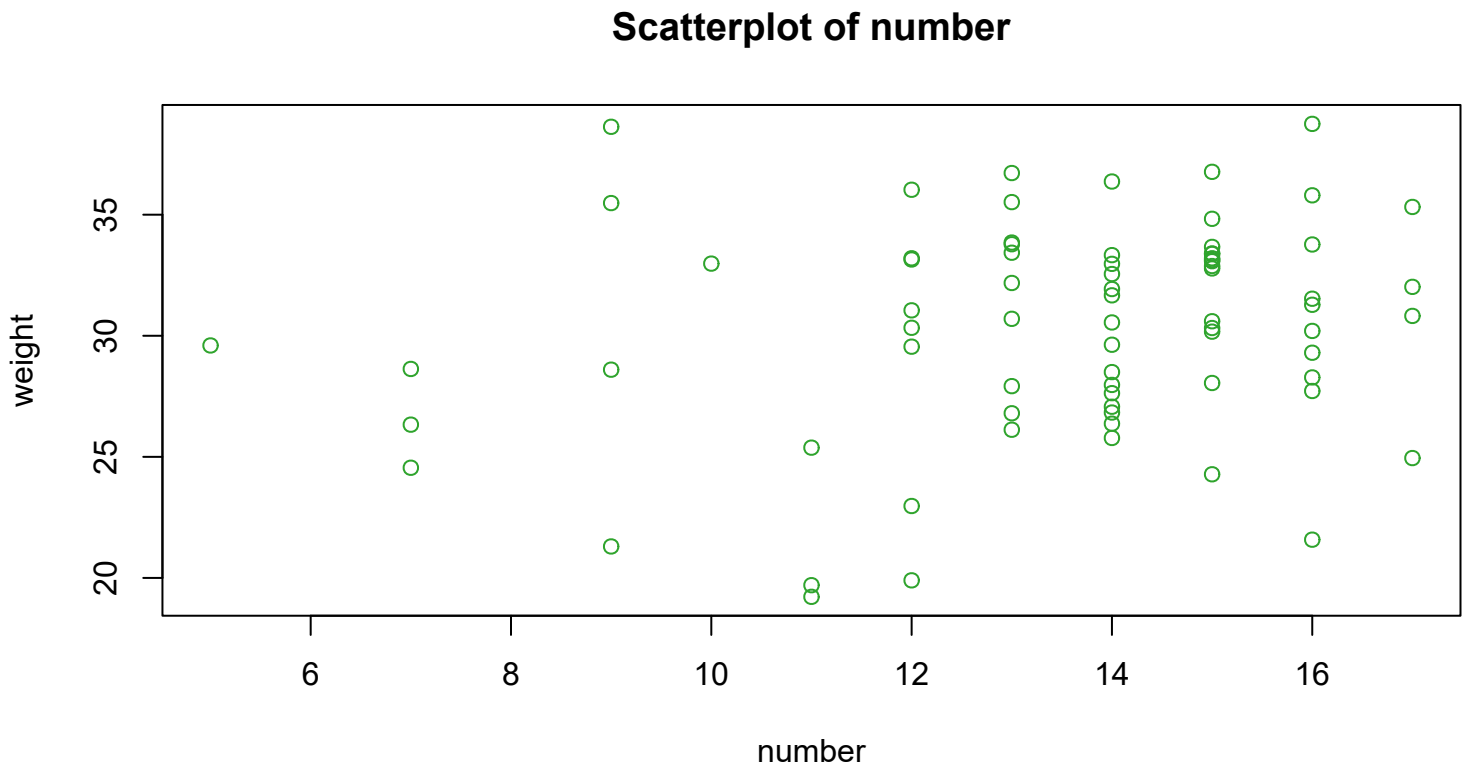

Boxplot of weight
20
25
30
35
weight

Dependent Against Categorical Factors




Boxplot of weight ~ gesttime
weight
20
25
30
35
21.5
22
22.5
23
gesttime

Dependent against Covariates



Interaction Plot for Factors

Note: The more parallel the lines, the less likely is the significance of the interaction of the factors.

Table 4: Parameter Estimates

Variable	Value	Std.Error	t.value	pvalue	sign. level[1]	Significance at 5 percent error
(Intercept)	24.86	2.60	9.57	<0.001	***	Intercept Significant.
dose1	1.93	0.77	2.50	0.015	*	Significant. A Difference between the effect of dose1 and its reference.
dose2	-1.06	0.81	-1.31	0.194		Not Significant. No difference between the effect of dose2 and its reference.
dose3	-0.34	0.86	-0.39	0.694		Not Significant. No difference between the effect of dose3 and its reference.
gesttime1	-3.52	0.94	-3.74	<0.001	***	Significant. A Difference between the effect of gesttime1 and its reference.

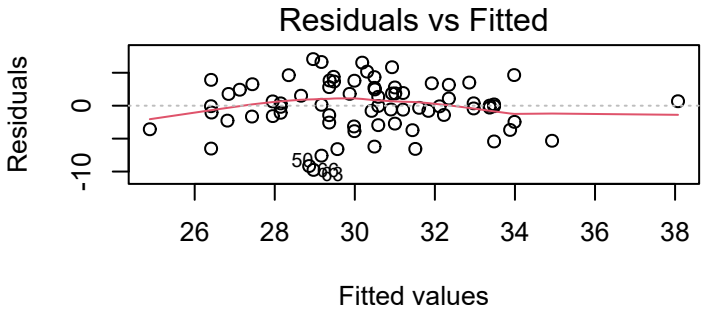
Table 4: Parameter Estimates *(continued)*

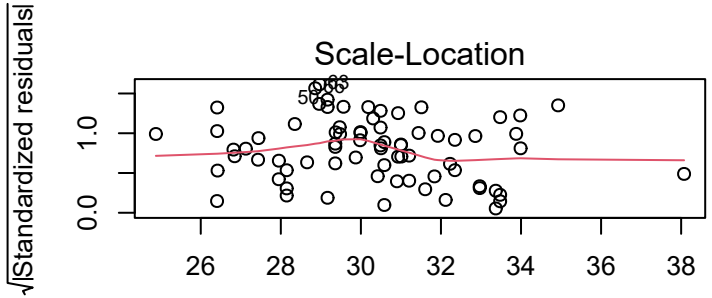
Variable	Value	Std.Error	t.value	pvalue	sign. level[1]	Significance at 5 percent error
gesttime2	-1.08	0.89	-1.22	0.227		Not Significant. No difference between the effect of gesttime2 and its reference.
gesttime3	-0.97	0.90	-1.08	0.286		Not Significant. No difference between the effect of gesttime3 and its reference.
number	0.51	0.20	2.59	0.012	*	Significant. A Difference between the effect of number and its reference.

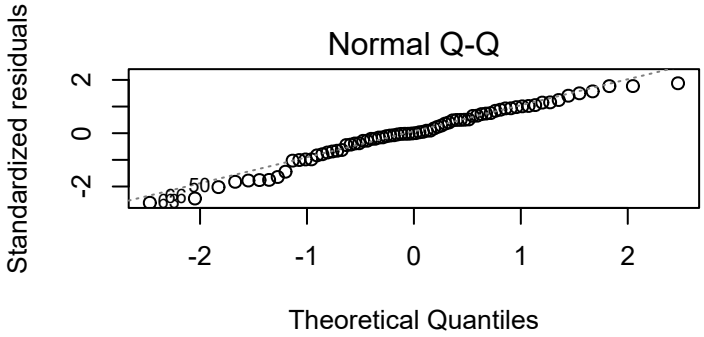
[1] '***': sign. to 0.1% error. '**': sign. to 1% error. '*': sign. to 5% error. ' . ': sign. to 10% error. ' ': not sign. ' - ': no statement.

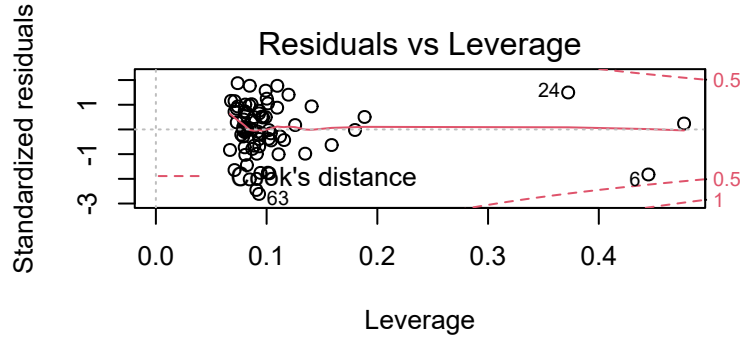
```
Anova Table (Type III tests)

Response: weight
             Sum Sq Df F value    Pr(>F)
(Intercept) 1406.03  1 91.4959 4.355e-14 ***
dose         100.40  3  2.1778  0.098906 .
gesttime     226.18  3  4.9062  0.003874 **
number       102.89  1  6.6954  0.011875 *
Residuals   1014.23 66
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```










```
     Simultaneous Tests for General Linear Hypotheses

Multiple Comparisons of Means: Dunnett Contrasts


Fit: lm(formula = modelfunction, data = df_factorized)

Linear Hypotheses:
             Estimate Std. Error t value Pr(<t)
5 - 0 >= 0     -2.988      1.282  -2.331 0.0305 *
50 - 0 >= 0    -2.273      1.316  -1.728 0.1087
```

```
500 - 0 >= 0   -2.468      1.312  -1.881 0.0810 .
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
(Adjusted p values reported -- single-step method)


     Simultaneous Confidence Intervals

Multiple Comparisons of Means: Dunnett Contrasts


Fit: lm(formula = modelfunction, data = df_factorized)

Quantile = 2.1123
95% family-wise confidence level


Linear Hypotheses:
             Estimate lwr     upr
5 - 0 >= 0   -2.9883     -Inf -0.2809
50 - 0 >= 0  -2.2729     -Inf  0.5059
500 - 0 >= 0 -2.4681     -Inf  0.3035
```

References

Fox, John, and Sanford Weisberg. 2019. *An R Companion to Applied Regression*. Third. Thousand Oaks CA: Sage. https://socialsciences.mcmaster.ca/jfox/Books/Companion/.

Gross, Juergen, and Uwe Ligges. 2015. *Nortest: Tests for Normality*. https://CRAN.R-project.org/package=nortest.

Madsen, Jacob H. 2018. *DDoutlier: Distance & Density-Based Outlier Detection*. https://CRAN.R-project.org/package=DDoutlier.

R Core Team. 2019. *R: A Language and Environment for Statistical Computing*. Vienna, Austria: R Foundation for Statistical Computing. https://www.R-project.org/.

Zeileis, Achim, and Torsten Hothorn. 2002. "Diagnostic Checking in Regression Relationships." *R News* 2 (3): 7–10. https://CRAN.R-project.org/doc/Rnews/.