

Multiple Comparison Procedures To A Control

For AN(C)OVA Models

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Contributors*

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*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: $\text{weight} \sim \text{dose} + \text{gesttime} + \text{number}$

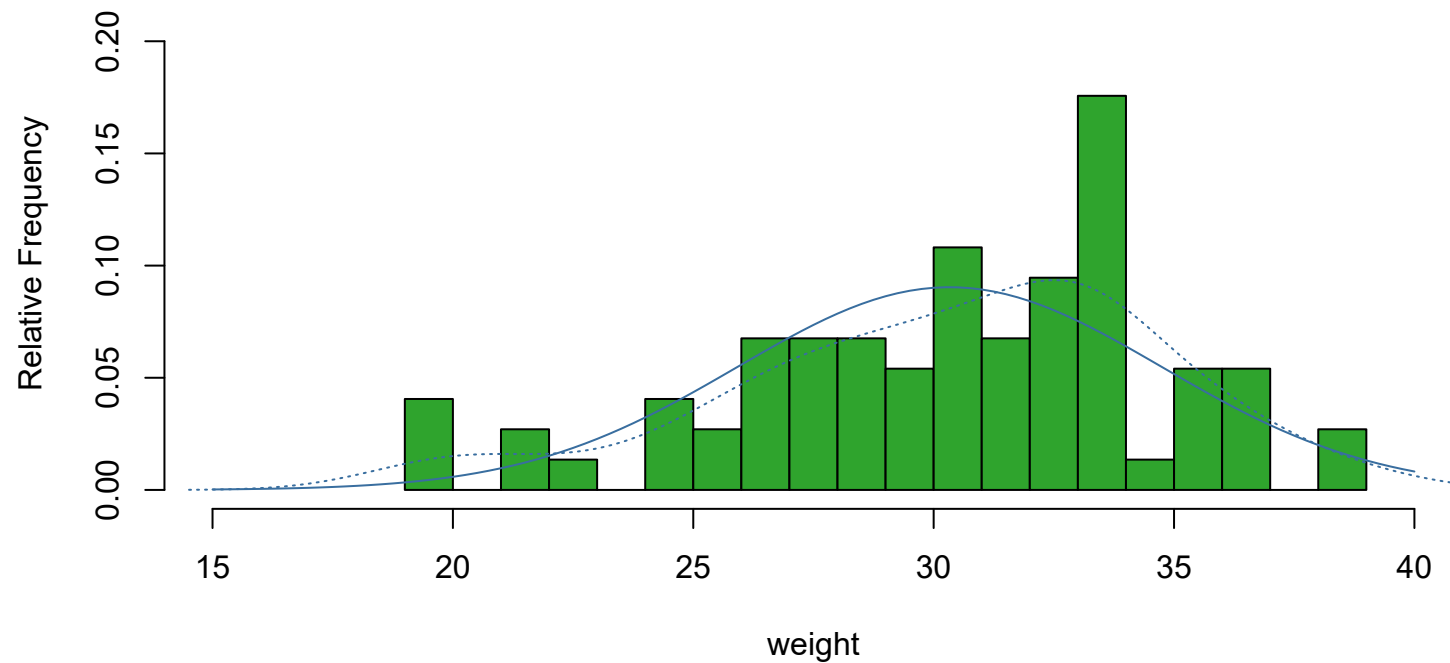
You are interested in the factor: dose

You are interested in pairwise comparisons to the control factor level: 0

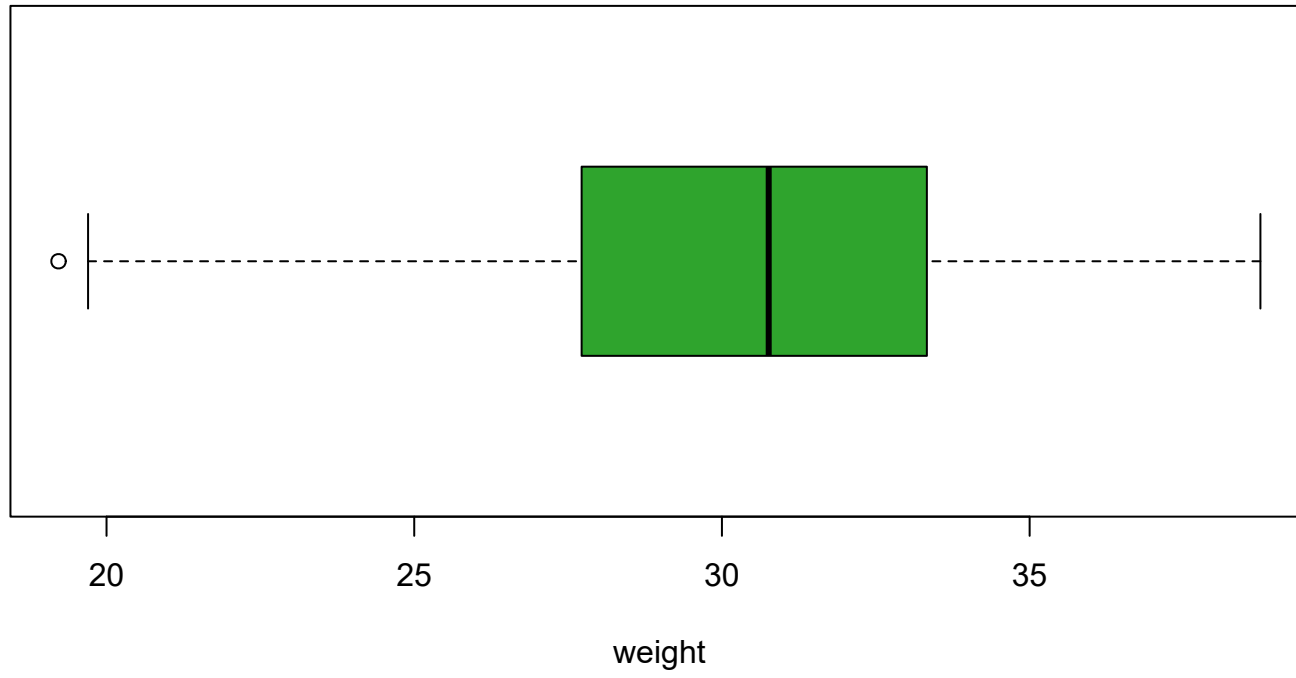
Descriptive Plots

Dependent Variable

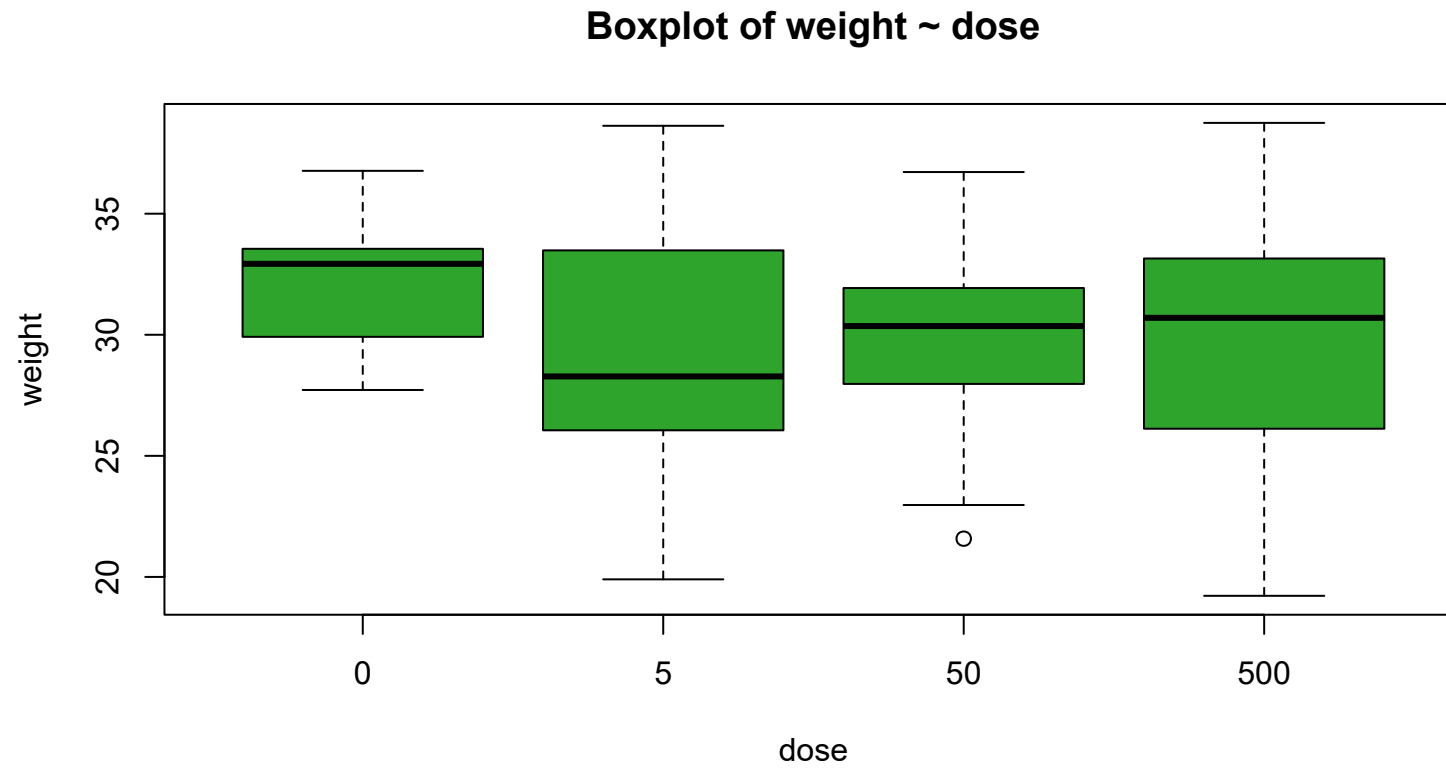
Histogram of weight



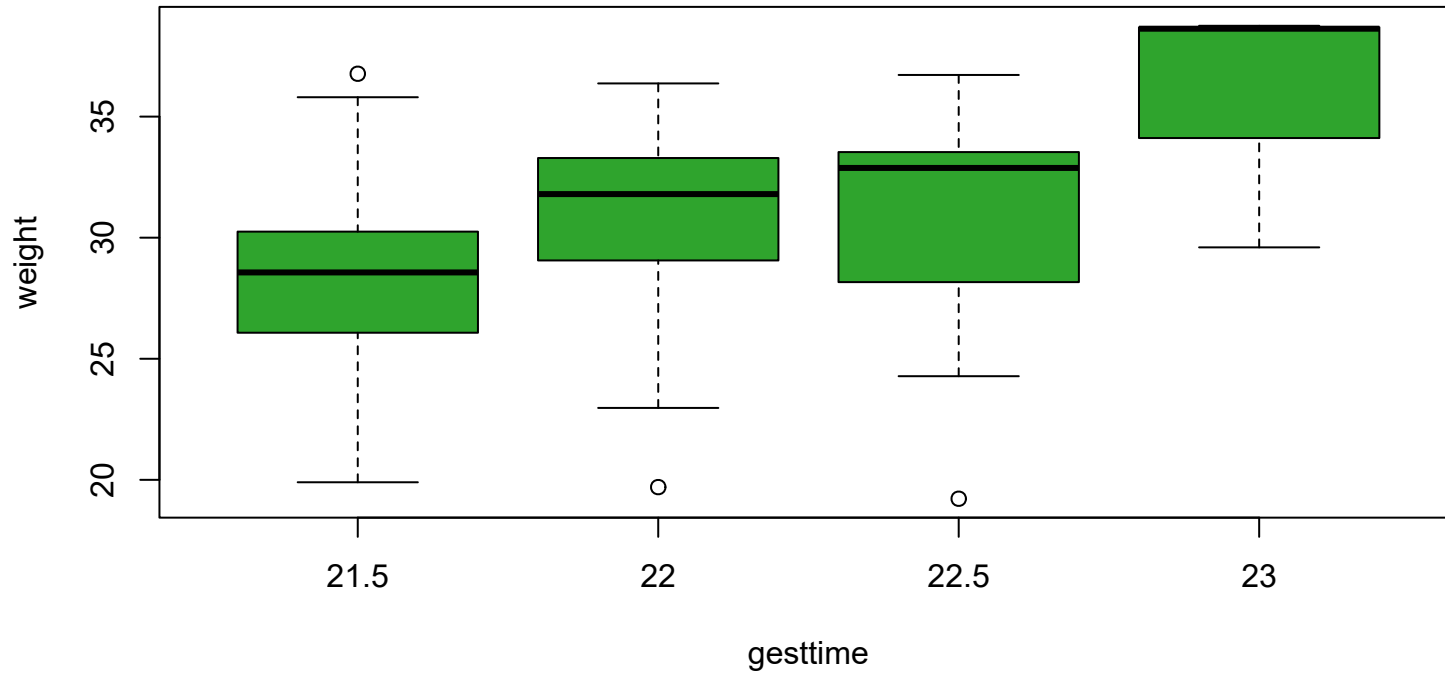
Boxplot of weight



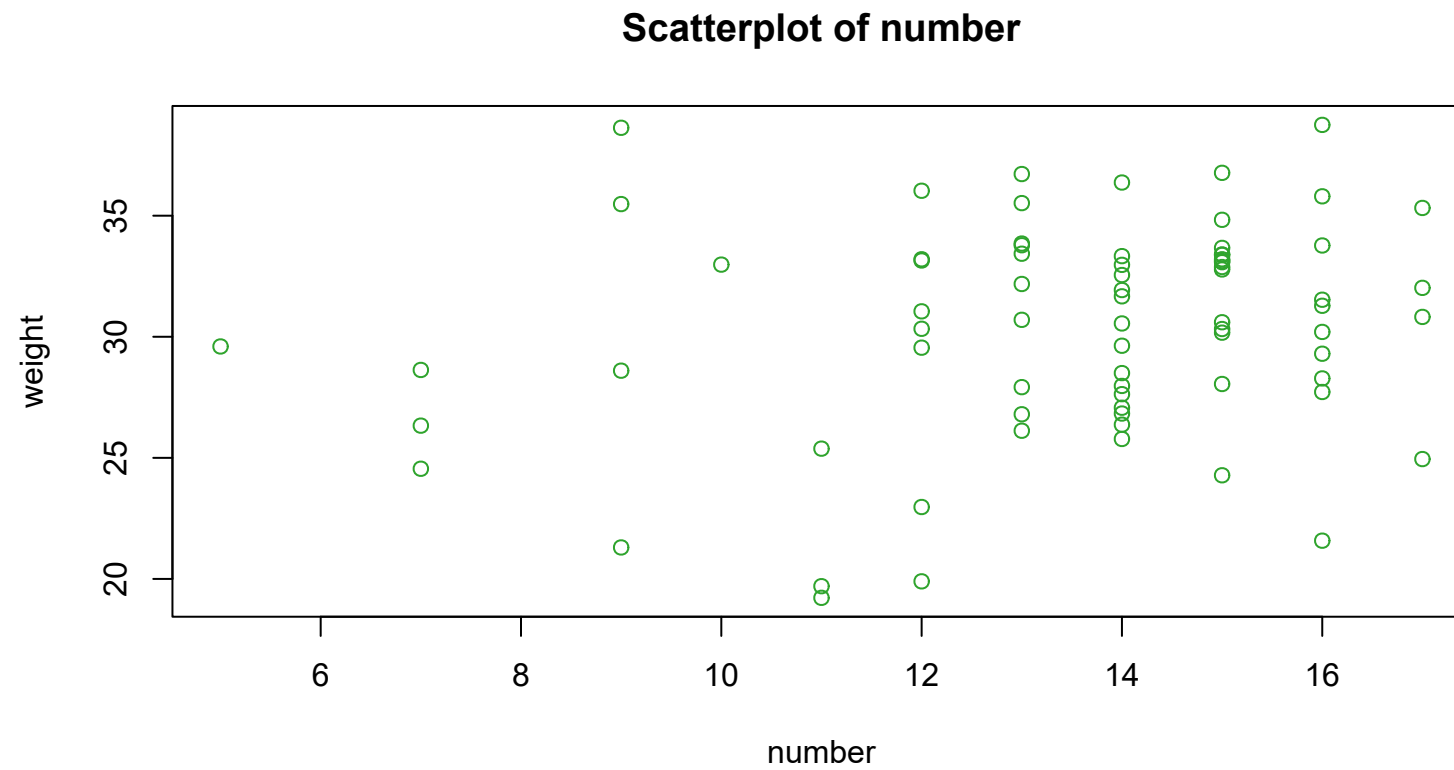
Dependent Against Categorical Factors



Boxplot of weight ~ 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.

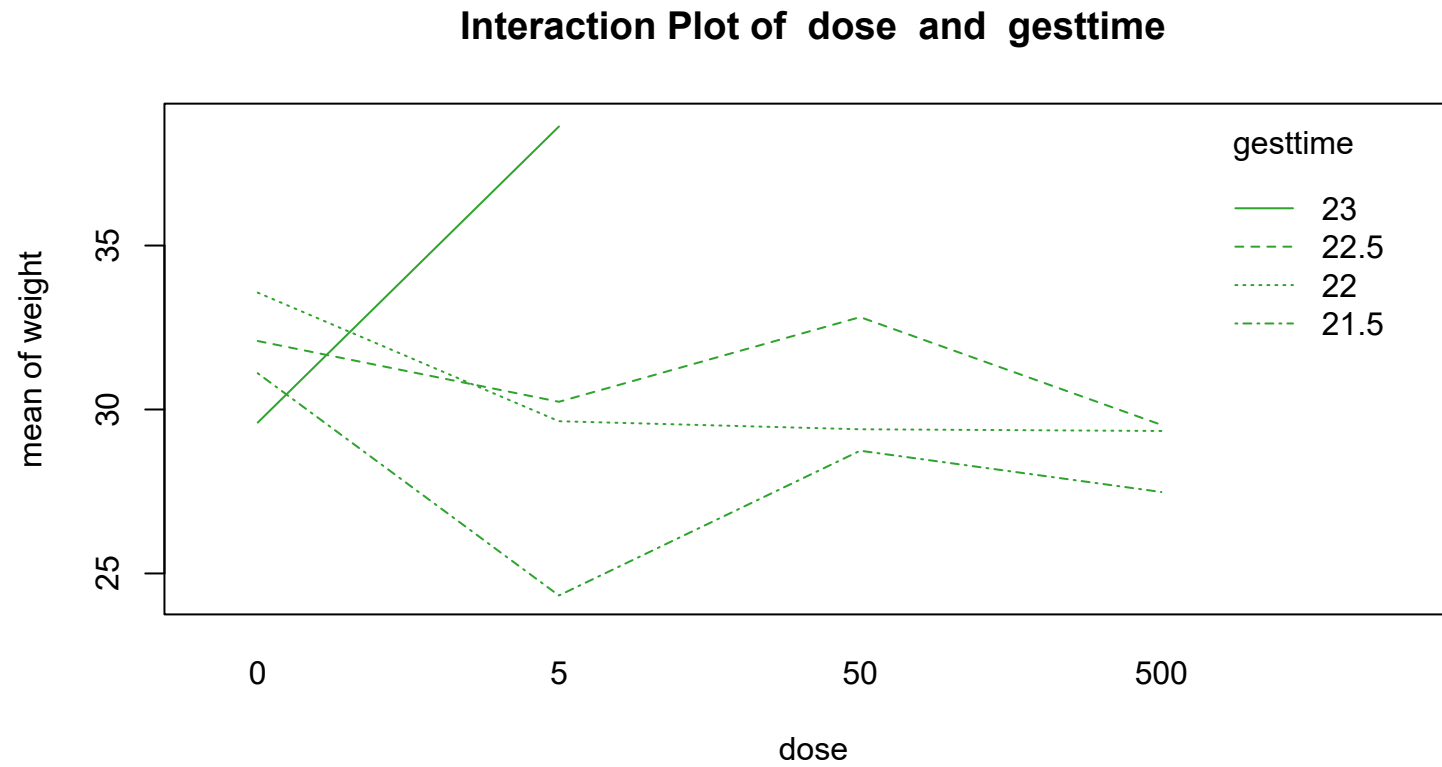


Table 4: Parameter Estimates

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.
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.

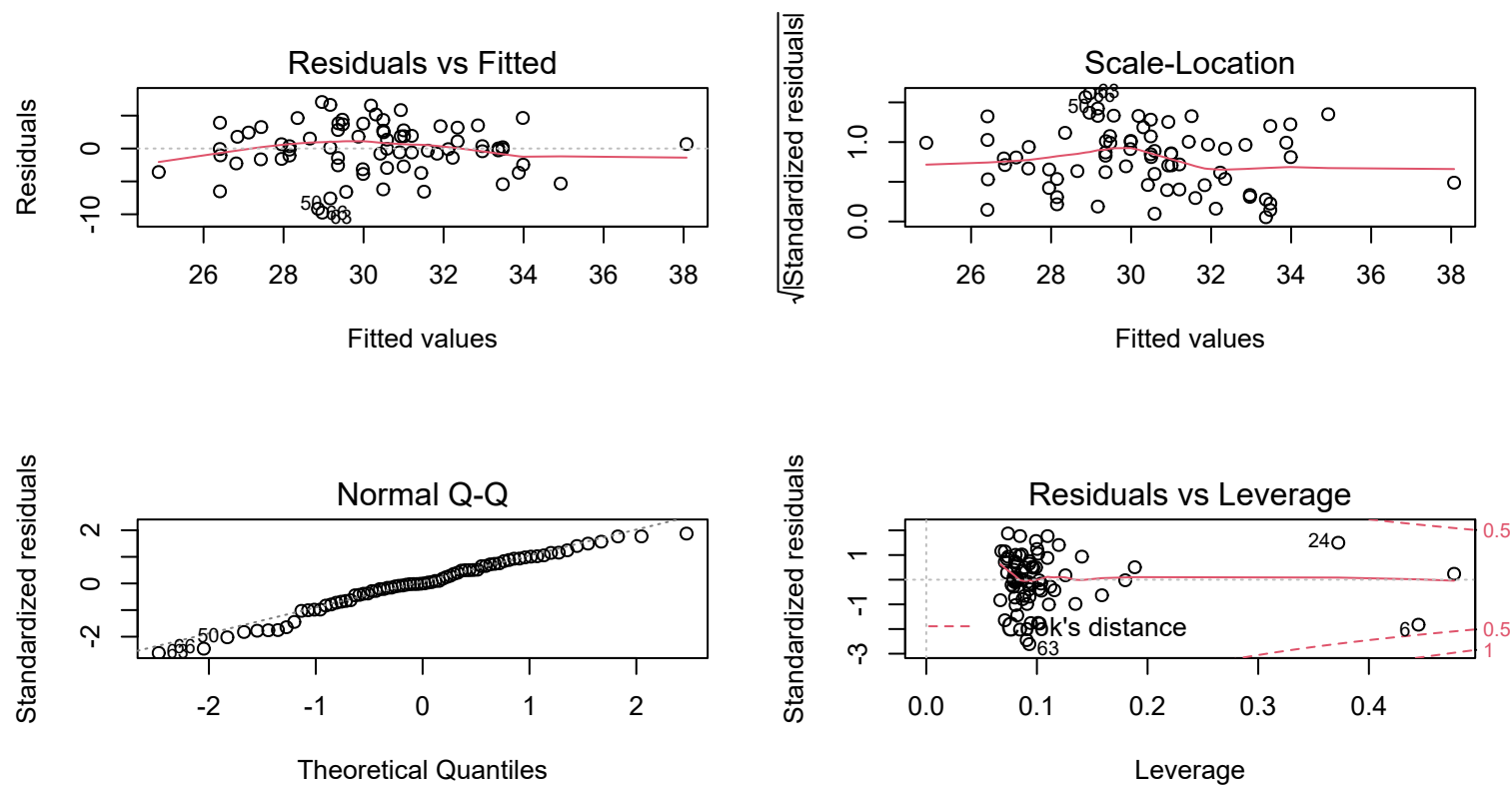
¹ '***': sign. to 0.1% error. '**': sign. to 1% error. '*': sign. to 5% error. '.' : sign. to 10% error. ' ': not sign. ' - ': no statement.

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	0.1088

```

500 - 0 >= 0    -2.468      1.312 -1.881 0.0812 .
---
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 = 2.112
95% family-wise confidence level
```

Linear Hypotheses:

	Estimate	lwr	upr
5 - 0 >= 0	-2.9883	-Inf	-0.2813
50 - 0 >= 0	-2.2729	-Inf	0.5055
500 - 0 >= 0	-2.4681	-Inf	0.3031

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/>.